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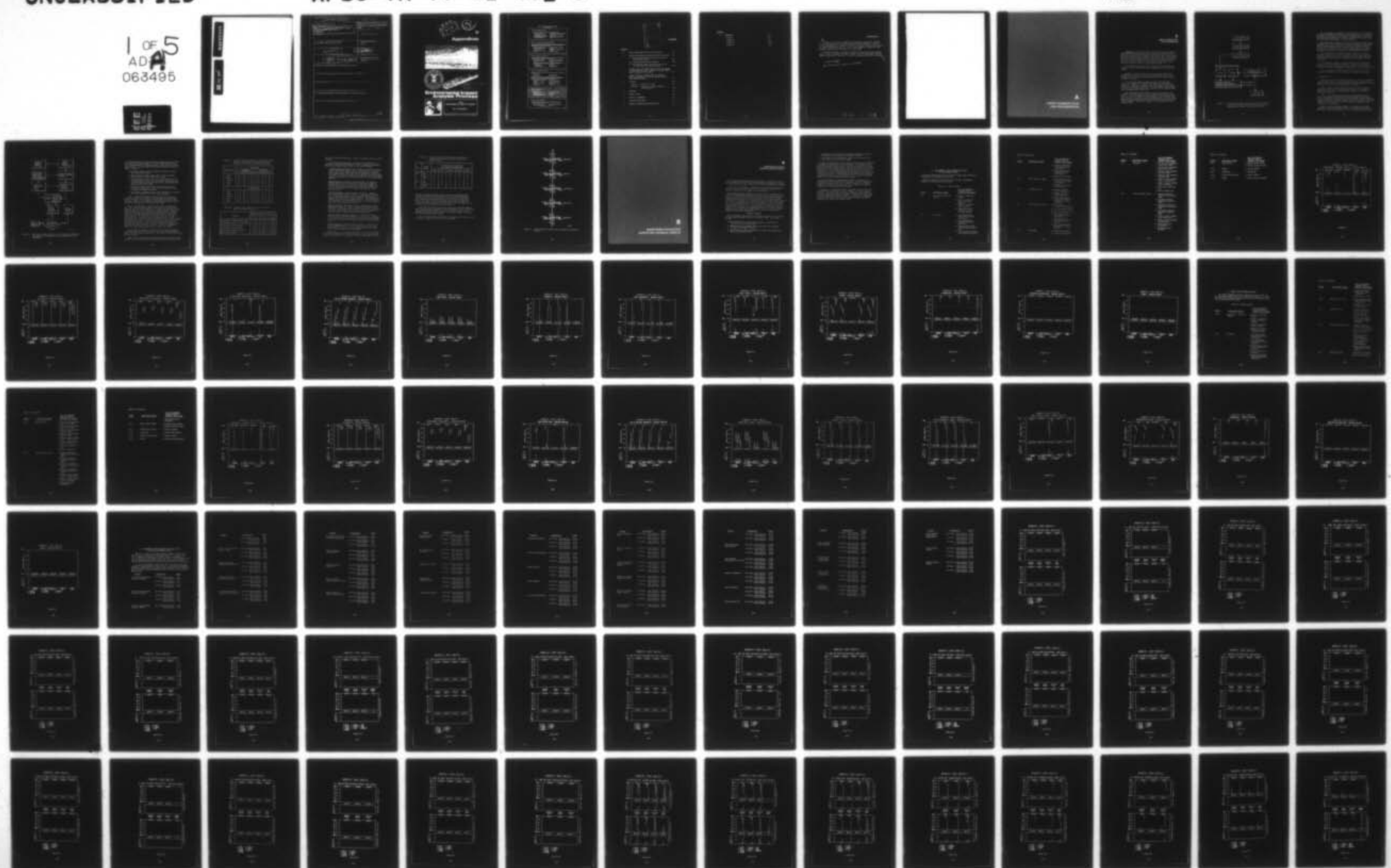

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Appendices

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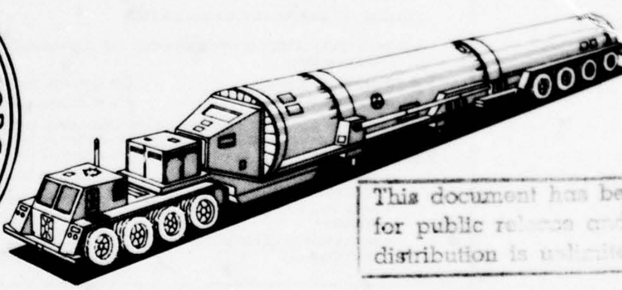

Environmental Impact Analysis Process

FINAL
ENVIRONMENTAL IMPACT STATEMENT

MX: MILESTONE II

DEPARTMENT OF THE AIR FORCE

FINAL ENVIRONMENTAL IMPACT STATEMENT
MX MILESTONE II

VOLUME I: PROGRAM OVERVIEW

VOLUME I PRESENTS AN OVERVIEW OF THE ENTIRE MX SYSTEM INCLUDING:

- THE MX MISSILE AND BASING MODE ACQUISITION PROCESS
- THE ENVIRONMENTAL PROGRAM AND ENVIRONMENTAL STATEMENTS TO BE PREPARED FOR DECISION-MAKERS AND THE PUBLIC
- A SUMMARY OF THE POTENTIAL ENVIRONMENTAL EFFECTS OF PAST AND FUTURE MX DECISIONS
- IDENTIFICATION OF FUTURE ACTIONS ANTICIPATED AS PART OF THE MX SYSTEM

VOLUME II: FULL-SCALE ENGINEERING DEVELOPMENT

VOLUME II ADDRESSES THE ENVIRONMENTAL IMPACTS OF EXPENDITURE OF RESOURCES TO DESIGN, CONSTRUCT, AND TEST MISSILE AND BASING MODE VEHICLE COMPONENTS AND THE ASSEMBLED MISSILE AND VEHICLES. KEY ISSUES ARE:

- EXPENDITURE OF $5 TO $7 BILLION FOR FULL-SCALE ENGINEERING DEVELOPMENT (FSED)
- CREATION OF JOBS THROUGHOUT THE NATION
- GROWTH INDUCEMENT CONCENTRATED IN 9 STATES
- CONSUMPTION OF ENERGY AND WATER RESOURCES
- ATMOSPHERIC EMISSIONS

VOLUME III: MISSILE FLIGHT TESTING

VOLUME III PROJECTS ENVIRONMENTAL IMPACTS OF MX FLIGHT TESTS ON VANDENBERG AIR FORCE BASE AND CENTRAL CALIFORNIA. KEY ISSUES INCLUDE:

- GROWTH RELATED IMPACTS TO NORTHERN SANTA BARBARA COUNTY
- CUMULATIVE IMPACTS OF MX, THE SPACE SHUTTLE, AND THE PROPOSED LNG PLANT
- FOUR CANDIDATE SITING AREAS (CSA) WERE EVALUATED TO ASSESS SITE SPECIFIC ENVIRONMENTAL IMPACTS RELATED TO THE FOLLOWING KEY ISSUES:
  - –TRANSPORTATION
  - –WATER RESOURCES
  - –RARE OR ENDANGERED SPECIES
  - –AIR QUALITY
  - –ARCHAEOLOGY
  - –MINERAL RESOURCES

VOLUME IV: BASING MODE EVALUATION

VOLUME IV EVALUATES THE ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE FOLLOWING FOUR BASING MODES:

- VERTICAL SHELTER
- BURIED TRENCH
- HORIZONTAL SHELTER
- SLOPE-SIDED POOL

THE POTENTIAL FOR ENVIRONMENTAL IMPACT ASSOCIATED WITH EACH BASING MODE IS EVALUATED AT SEVEN BASING MODE COMPARISON AREAS (BMCA) THROUGHOUT THE WESTERN UNITED STATES. KEY ENVIRONMENTAL ISSUES INCLUDE:

- VARIATION OF SPACING BETWEEN AIMPOINTS
- AREA SECURITY VERSUS POINT SECURITY
- DISTURBED OR UNDISTURBED ENVIRONMENT
- PUBLIC OR PRIVATE LAND
- WATER RESOURCES REQUIRED
- CONSTRUCTION RESOURCES REQUIRED
- ENERGY RESOURCES REQUIRED

VOLUME V: APPENDICES

VOLUME V CONTAINS:

- BIOLOGICAL APPENDICES AND SPECIES LISTS
- REGIONAL INDUSTRIAL MULTIPLIER SYSTEM (RIMS) DESCRIPTION
- BASING MODE EVALUATION
- GLOSSARY
- REFERENCES

VOLUME VI: PUBLIC COMMENTS

VOLUME VI PRESENTS PUBLIC RESPONSE TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT. INCLUDED IN THIS VOLUME ARE:

- LETTERS RECEIVED FROM AGENCIES AND ORGANIZATIONS
- RESPONSES TO QUESTIONS RAISED BY THE PUBLIC
- PUBLIC HEARING TRANSCRIPTS

372P 994

CONTENTS

APPENDIX

A	LOMPOC TRANSPORTATION ANALYSIS DESCRIPTION	A-1
B	BASING MODE EVALUATION SUPPORTING TECHNICAL RESULTS	B-1
	B.1 Environmental Impact Potentials for each of the Concerned Sectors	B-3
	B.2 Reduced Spacing Between Aimpoints	B-20
	B.3 Environmental Impact Potentials for each of the Individual Environmental Effects	B-37
C	STATUS OF SPECIAL INTEREST PLANT SPECIES AND ANALYSIS OF TERRESTRIAL WILDLIFE OCCURRING ON OR NEAR VANDENBERG MX CANDIDATE SITING AREAS	C-1
D	STATUS OF SPECIAL INTEREST PLANT AND WILDLIFE SPECIES OCCURRING ON OR NEAR MX CANDIDATE BASING MODE COMPARISON AREAS	D-1
E	GLOSSARY	E-1
	Glossary 1 - Terms Used in Text	E-1
	Glossary 2 - Glossary of Standard Industrial Classifications	E-16
F	ACRONYMS	F-1
G	METRIC SYSTEM	G-1
H	UNITS OF MEASUREMENT	H-1
I	GEOLOGICAL TIME SCALE	I-1
J	REGIONAL INDUSTRIAL MULTIPLIER SYSTEM	J-1

APPENDIX

K	REFERENCES	K-1
	Volume I	K-1
	Volume II	K-3
	Volume III	K-16
	Volume IV	K-50

INTRODUCTION

Volume V is a series of appendices containing supplementary material for the MX:Milestone II, Final Environmental Impact Statement. Section A is a discussion of an analyses of some of the traffic projections reported in Volume III* Sections B, C, D and J contain technical support and supplementary materials for Volumes II, III, and IV**

Sections E through I include a glossary of terms used in the complete text, a list of acronyms, the metric system, units of measurement, and the geologic time scale. Section K is a list of references for all the volumes.

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A

LOMPOC TRANSPORTATION ANALYSIS DESCRIPTION

A

LOMPOC TRANSPORTATION ANALYSIS DESCRIPTION

Introduction. Volume III (Missile Flight Testing) of this Environmental Impact Statement reported on an analysis of projected traffic conditions along "H" Street in Lompoc, CA, during a "worst case" scenario: both MX and Space Shuttle operation in 1985 (p. III-351). According to that section no significant congestion would result from those projects, except for moderate congestion at the intersection of North Avenue and "H" Street. At that location, relatively minor improvements could improve intersection operation to satisfactory levels.

This Appendix explains the analysis employed to reach these conclusions, along with background data, computations and other pertinent details.

Overview. Figure A-1 shows the basic process whereby land use changes lead to increased (or decreased) traffic and, finally, to government decisions to modify or add resources to an area's existing transportation system.

Box 1 represents land use changes in the travel shed under study. These changes could include the addition or subtraction of residential, commercial, industrial, and recreational or other land uses that are served by automobiles. The type, quantity and geographic location of each change must be known (such as 200 new detached single family dwellings north of the city).

Box 2 represents the translation of land use information into estimates of the trips made to move persons or goods to and from each land use. Since the number of trips attracted to or produced by each type of land use is fairly constant throughout the U.S. (and over time) established trip generation factors can be multiplied by each land use change estimate to determine the number of trips associated with the land use change.

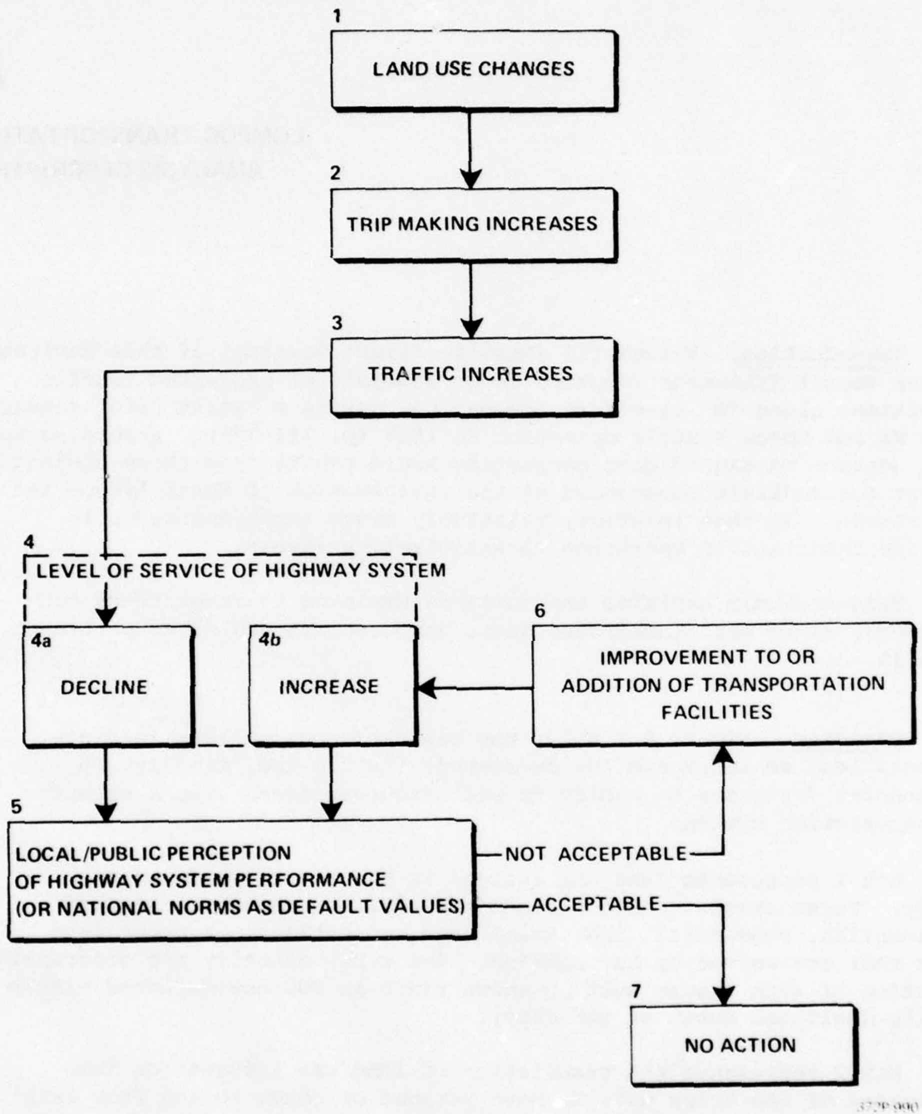


Figure A-1. Flow chart showing the basic process whereby land use changes affect traffic and modification of existing transportation systems by governmental agencies.

Box 3 represents the assignment of trips from Box 2 to the existing or proposed transportation system in the area under study. Such assignment results in estimates of the number of vehicles per hour at critical locations during peak periods of the day (usually 4:30 to 5:30 pm) that are specifically attributable to the new land uses.

Box 4 represents estimates of the level of service provided by each transportation facility affected by the land use changes. This step considers both the traffic attributable to the land use changes themselves and the traffic that would exist even without the changes. The level of service will decrease as more traffic is added (4a) and increase as improvements or additions are made to the transportation system (4b).

Box 5 represents an assessment of whether the level of service determined in Box 4 is or is not acceptable. In most cases, local perception of transportation facility adequacy should be used to make this determination. As a substitute, national norms of acceptable service can be used.

Box 6 represents measures to improve locations with unacceptable levels of service by changing the amount or efficiency of the area's transportation system. Such measures could include the construction of new streets or roads, the addition of turning lanes at intersections, etc.

Box 7 represents the condition where transportation facilities operate at acceptable levels of service and no changes are indicated.

APPLICATIONS TO MX

Figure A-1 presents the generalized "land use → traffic → transportation decision" process. Figure A-2 converts this basic process into specific steps to analyze the traffic impact on Lompoc caused by the implementation of the MX and Shuttle projects at Vandenberg.

Box 1: Land use changes were taken as given from other material developed for the EIS. The principal change was an 11% increase in dwelling units for Lompoc and areas north of Lompoc for the 1985 MX plus Shuttle scenario.

Box 2: It was assumed that one work trip per dwelling would be made in each peak hour, and that the ratio of nonwork to work trips and the distribution of trips during the peak periods would be essentially similar to existing conditions. Between 0.86 and 1.59 nonwork trips were estimated for each 1.0 work trip in the peak hour, depending on the location under consideration.

Box 3: A review of Lompoc was made to determine where the most significant traffic impacts would occur. As a result of this review and from the concerns expressed by the City of Lompoc engineering staff,

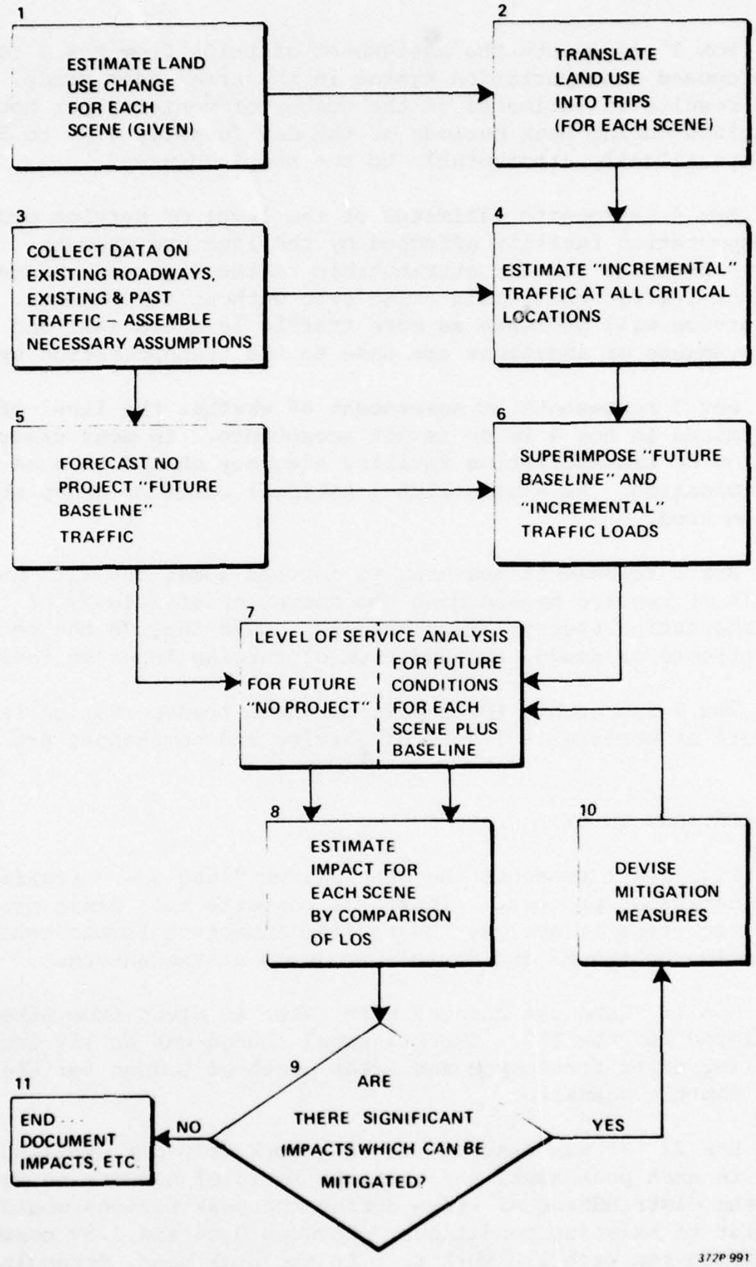


Figure A-2. Flow chart showing the specific traffic impact on the Lompoc area caused by implementation of MX and Space Shuttle at Vandenberg.

it was determined that the most significant impacts would occur along "H" Street between Ocean and North. Five intersections along this section were selected for detailed analysis: Ocean, Walnut, College, Pine and North. Various primary and secondary data were collected in Lompoc, including:

- Historical traffic counts describing the growth in traffic over the past five years.
- Twenty-four hour traffic counts along "H" Street showing the variation of traffic demand over the day.
- Turning movement traffic counts at the intersections of "H" and Ocean, Walnut, College, Pine and North, including counts of pedestrians, bicycles, and heavy trucks (these counts were made on 13 June 1978 by HDR).
- Air photos of each intersection along "H" Street showing intersection geometry at a scale of 20 feet equals one inch and showing surrounding land uses.
- Other physical information about those intersections, including the current operation of traffic signal equipment.

Box 4: Lompoc was divided into three zones and work and non-work trips for each zone from Box 2 were assigned to the five intersections from Box 3 so that the most logical path was used for each trip type. Table A-1 is a summary of the MX/Shuttle related trips for each of the intersections on "H" Street under study.

Box 5: By comparison to historical and forecast dwelling unit data, and by using historical traffic count data, it was possible to determine that the traffic growth rate in Lompoc over the study period could be expected to be 0.86 percent per annum compounded. Given the liklihood that factors not included in this analysis could increase this rate, that other comparable rates through the U.S. tend to be higher, and that "H" Street will grow faster than most of Lompoc, it was assumed that two percent per annum compounded would be a more appropriate rate. Since this tends to increase baseline traffic, thereby increasing the liklihood of low levels of service, the approach taken was conservative as well. Given that the outcome of the analysis indicated only minor congestion, a conservative approach appears most appropriate in practice as well as theory. Using this assumption, Table A-2 shows estimated future traffic levels on "H" Street.

Box 6: Both the forecast "no project" and "incremental" traffic loads associated with the MX and Shuttle projects were superimposed at each of the five locations under study. The results of this task area are shown on Figure A-3.

Boxes 7 and 8: Using the Critical Lane Method, the level of service provided by each intersection was estimated for baseline conditions and

Table A-1. Estimated 1985 p.m. peak hour "incremental" traffic levels on "H" Street (work- and nonwork) attributable to MX, Shuttle, and combined operations.

INTERSECTION	WORK TRIPS					
	SOUTHBOUND			NORTHBOUND		
	MX	SHUTTLE	TOTAL	MX	SHUTTLE	TOTAL
Ocean	68	141	209	52	88	140
Walnut	74	153	227	56	96	152
College	90	185	273	68	116	183
Pine	103	211	313	78	133	210
North	82	169	250	62	106	168
NONWORK TRIPS						
Ocean	59	122	180	45	76	121
Walnut	71	146	217	54	92	145
College	81	167	246	61	105	165
Pine	89	183	271	68	115	182
North	130	268	397	98	168	267

Table A-2. Estimated future traffic levels on "H" Street under "no project" conditions.

SECTION	ANNUAL AVERAGE DAILY TRAFFIC		
	1977	1981	1985
Ocean Avenue to Maple-Laurel Avenue	15,300	16,600	17,900
Maple-Laurel Avenue to College Avenue	17,000	18,400	19,900
College Avenue to Pine Avenue	16,700	18,100	19,600
Pine Avenue to North Avenue	16,400	17,800	19,200
North Avenue to Central Avenue	14,300	15,500	16,800
Above Central Avenue	17,200	18,600	20,200

for each of the project scenarios. Table A-3 shows the results of those analyses.

The description of each level of service for intersections as published in the National Academy of Science's Transportation Research Board Highway Capacity Manual (1965, p. 130) are as follows:

> "At level of service A there are no loaded cycles and few are even close to loaded. No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Typically the approach appears quite open, turning movements are easily made, and nearly all drivers find freedom of operation, their only concern being the chance that the light will be red, or turn red, when they approach.
>
> Level of service B represents stable operation, an occasional approach phase is fully utilized and a substantial number are approaching full use. Many drivers begin to feel somewhat restricted within platoons of vehicles. Under typical rural conditions this frequently will be suitable operation for rural design purposes.
>
> In level of service C stable operation continues. Loading is still intermittent, but more frequent. Occasionally drivers may have to wait through more than one red signal indication, and back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted, but not objectionably so. In the absence of local conditions dictating otherwise, this is the level typically associated within urban design practice.
>
> Level of service D encompasses a zone of increasing restriction approaching instability. Delays to approaching vehicles may be substantial during short peaks within the peak period, but enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive back-ups.
>
> Capacity occurs at level of service E. It represents the most vehicles that any particular intersection approach can accommodate. At capacity there may be long queues of vehicles waiting upstream of the intersection and delays may be great (up to several signal cycles).
>
> Level of service F represents jammed conditions. Back-ups from locations downstream or on the cross street may restrict or prevent movement of vehicles out of the approach under constraint; hence, volumes carried are not predictable."

Boxes 9 and 10: It was judged that level of service D or E would warrant the development of mitigating measures. Such levels were estimated to occur only at the intersection of North Avenue and "H" Street.

Table A-3. Level of service provided by each intersection as estimated for baseline conditions and for each project scenario.

YEAR	STATUS PROJECT	"H" STREET LEVEL OF SERVICE AT THE FOLLOWING INTERSECTIONS				
		NORTH	PINE	COLLEGE	WALNUT	OCEAN
1981	None	A	A	A	A	A
	MX	A	A	A	A	A
	Shuttle	B	A	A	A	B
	Both	B	A	A	A	B
1985	None	B	A	A	A	A
	MX	C	A	A	A	C
	Shuttle	D	C	B	A	C
	Both	D	C	C	A	C

Measures to reduce congestion at North Avenue were evaluated such as revising the existing lane configuration on the westbound approach (by restriping the intersection within the existing 40 ft wide paved area) from one approach lane and one exit lane to two approach lanes and one exit lane. The resulting change would reduce the number of conflicting movements within the intersection enough to provide for level of service C in the 1985—both projects scenario.

Since North Avenue was the location of the most significant impact, and a relatively minor adjustment to the configuration of that intersection reduced the MX/Shuttle traffic impact to satisfactory levels, it was concluded that little traffic impact on "H" Street in Lompoc would result from the 1985 both projects scenario.

Box 11: Based on the results above, the summary shown on page III-351 of Volume III, Missile Flight Testing, was prepared.

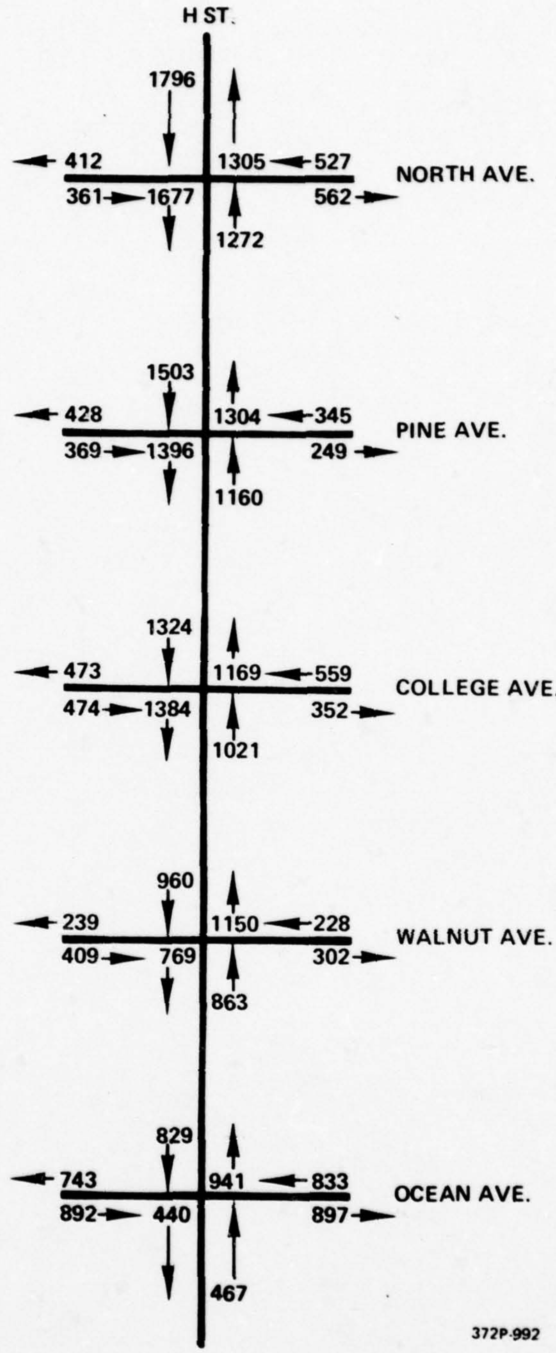


Figure A-3. 1985 pm peak hour traffic flows including MX and Shuttle traffic.

B

BASING MODE EVALUATION SUPPORTING TECHNICAL RESULTS

B

BASING MODE EVALUATION SUPPORTING TECHNICAL RESULTS

The 40 basic environmental variables discussed in Volume IV, Section 3, can be combined into 13 variables representing key environmental concerns of various interest groups. Table B-1 shows which variables were combined.

In section 3.3 of Volume IV, the method of representing perceptual set results at a particular set of values for the basing parameters is explained. Figure 3-8 is an example of this technique.

The following sections present the results of the environmental comparison of the candidate basing modes for two values of the project parameters. The first group, Section B.1, presents the environmental impact potentials for each of the 13 concerned sectors in the form of impact potential bar charts which are a function of the 13 representative concerns. The results are presented for a nominal configuration. The second group (B.2) is a corresponding result for a reduced spacing equal to 70 percent of the nominal spacing value. The third group (B.3) gives the corresponding results for each of the environmental impact potential associated with each of the individual environmental effects. The results are displayed for both nominal and expanded spacing with both area and point security and full and reduced forces.

ANALYSIS TECHNIQUE

The environmental analysis used to evaluate the impacts of the various multiple aimpoint systems consists of five major steps. These steps include:

- characterization of the engineering features, parametrically for each of the main basing modes
- determination of the primary engineering factors which produce the direct environmental effects
- identification of basic environmental variables which produce the direct environmental effects

- development of the functional relationships between the primary factors and the anticipated environmental variables
- development of the environmental impact levels associated with each perceived environmental variable.

The key to this analysis is the treatment of the project configuration in a parametric manner that reflects the range of conceivable system parameters or primary factors, and calculation of associated sensitivities to variations in these factors. The sensitivity functions reflect sensitivity of environmental impact potentials to changes in the project configuration. One can determine both the stability of the results relative to the project configuration and the adaptability of the project to mitigating actions. The environmental model uses systems analysis techniques to produce an overview picture of the relative environmental impact of each of the multiple aimpoint concepts.

All project features, environmental variables, and impacts are determined by defined functional relationships. The input required is a particular project element (e.g., number of aimpoints, spacing of aimpoints, configuration of aimpoints), and the output is an impact potential for a given variable at each BMCA.

Information on significant impacts is developed from the more than 200 engineering, environmental, legal baselines, and expert opinion, reduced to a consistent unit of measure, summarized, and formatted to facilitate comparisons among basing modes. Traceability is maintained from each summarized information item back to the baseline from which it was derived. Results are presented by basing mode configuration, potential site, impact, and interest group.

B.1 ENVIRONMENTAL IMPACT POTENTIALS FOR EACH OF THE CONCERNED SECTORS

The project parameters for this section are those listed in Table 1-1 of Volume IV for the nominal project size.

Table B-1 shows which anticipated concern of basic environmental variables are represented on each figure.

Table B-1. Nominal Project

FIGURE	ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
B-1	Interference—Important Species	• Threat to protected plants • Threat to protected small terrestrial animals • Threat to protected aquatic species • Exclusion of large mammals by fencing or human presence
B-2	Air Quality	• Dust (particulate) concentration during construction • Dust (particulate) concentration during operation • Nitrogen oxide concentration during construction • Sulfur dioxide concentration during construction

Table B-1 (continued)

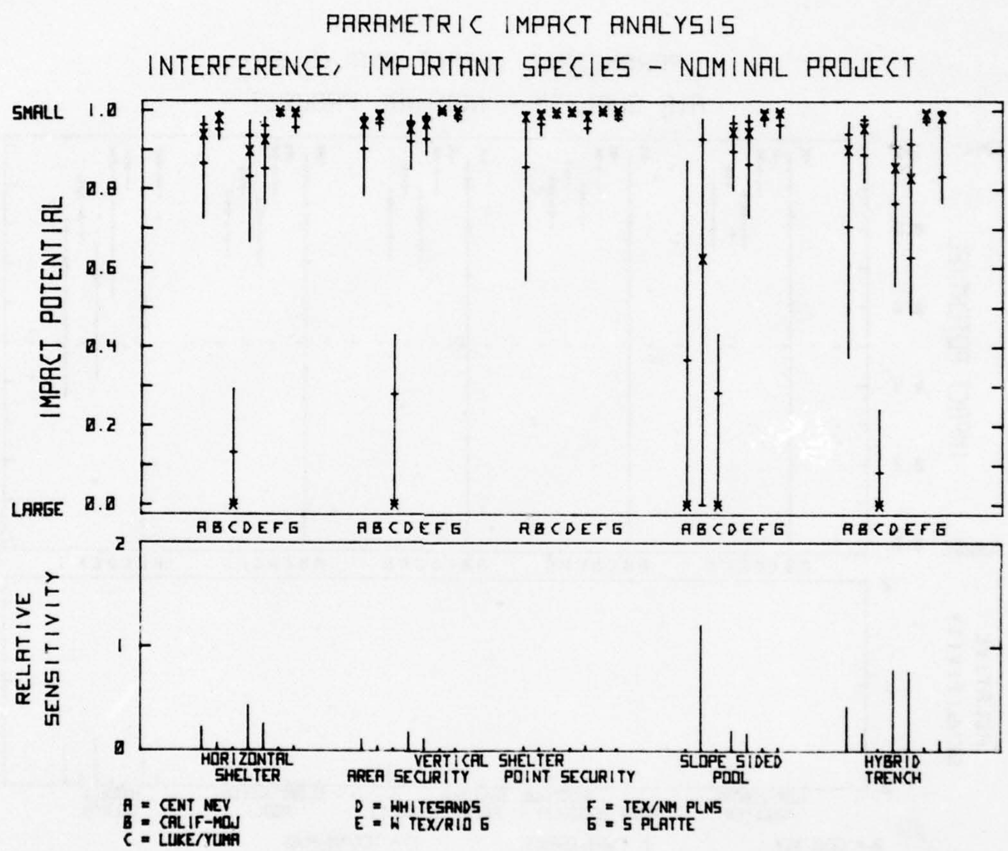
FIGURE	ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
		• Reactive hydrocarbon concentration during construction • Carbon monoxide concentration during construction • Potential for erosion
B-3	Water Quality & Supply	• Water available/water required for ten years of operation • Potential for erosion (sedimentation)
B-4	Land Access Loss	• Highway congestion during construction • Highway congestion during operation • Public lands required not currently under Department of Defense withdrawal
B-5	Use of Natural Resources	• Existing level of aesthetic degradation • Loss of natural habitat • Loss of vegetative cover • Dust (particulate) concentrations during construction • Dust (particulate) concentrations during operation • Water available/water required for 10 years operation
B-6	Land Rights	• Inhabitants displaced • Private land required

Table B-1 (continued)

FIGURE	ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
B-7	Economics	• Jobs for local residents - construction (BMCA)
		• Jobs for local residents - construction (EEP)
		• Jobs for local residents - operation (BMCA)
		• Jobs for local residents - operation (EEP)
		• Change in public expenditures - construction
		• Change in public expenditures - operation
		• Agriculture production lost
		• Mining revenues lost
B-8	Local Government Issues	• Resident population inmigration-construction (BMCA)
		• Resident population inmigration-operation (BMCA)
		• Nonresident population inmigration-construction (BMCA)
		• Nonresident population inmigration-operation (BMCA)
		• Change in public expenditures-construction
		• Change in public expenditures-operation
		• New housing units-construction
		• New housing units-operation

Table B-1 (continued)

FIGURE	ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
B-9	Public Safety	• Nuclear target concern • Nuclear accident concern
B-10	Airways	• Airways impeded
B-11	Archaeology	• Archaeology
B-12	Construction Materials	• Cement required
B-13	Energy	• Electric Energy required


PARAMETRIC IMPACT ANALYSIS
INTERFERENCE, IMPORTANT SPECIES - NOMINAL PROJECT
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IMPACT POTENTIAL
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RELATIVE SENSITIVITY
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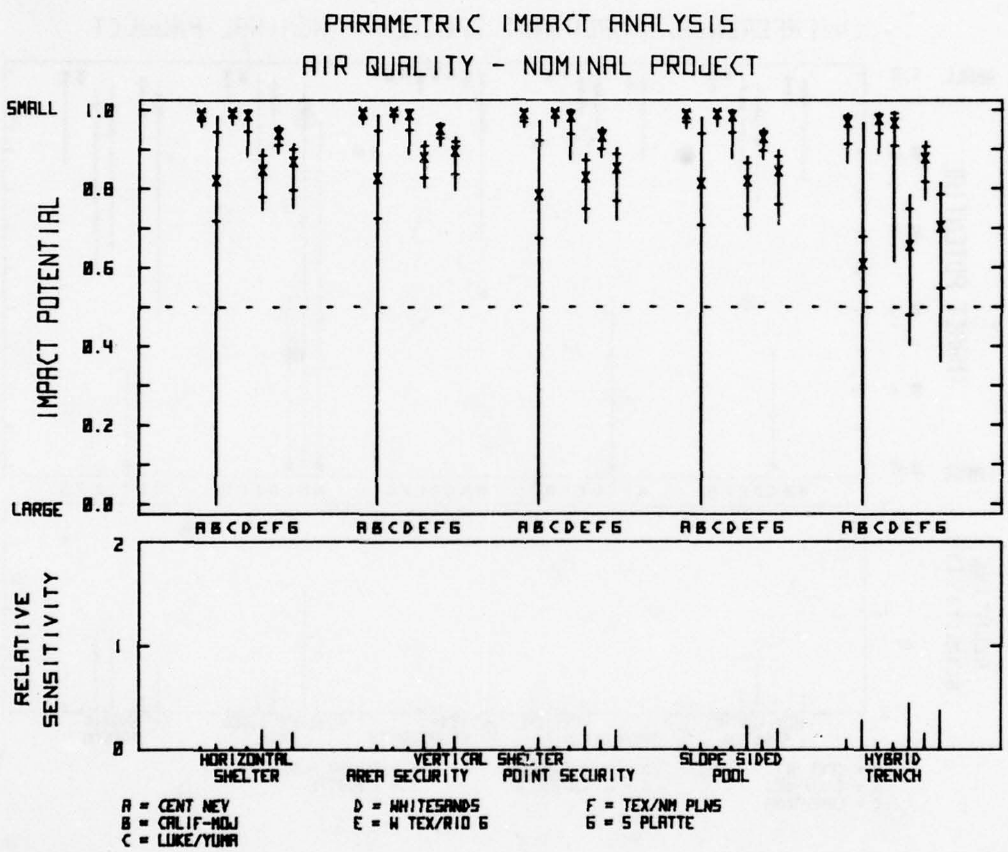
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-1.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AIR QUALITY - NOMINAL PROJECT
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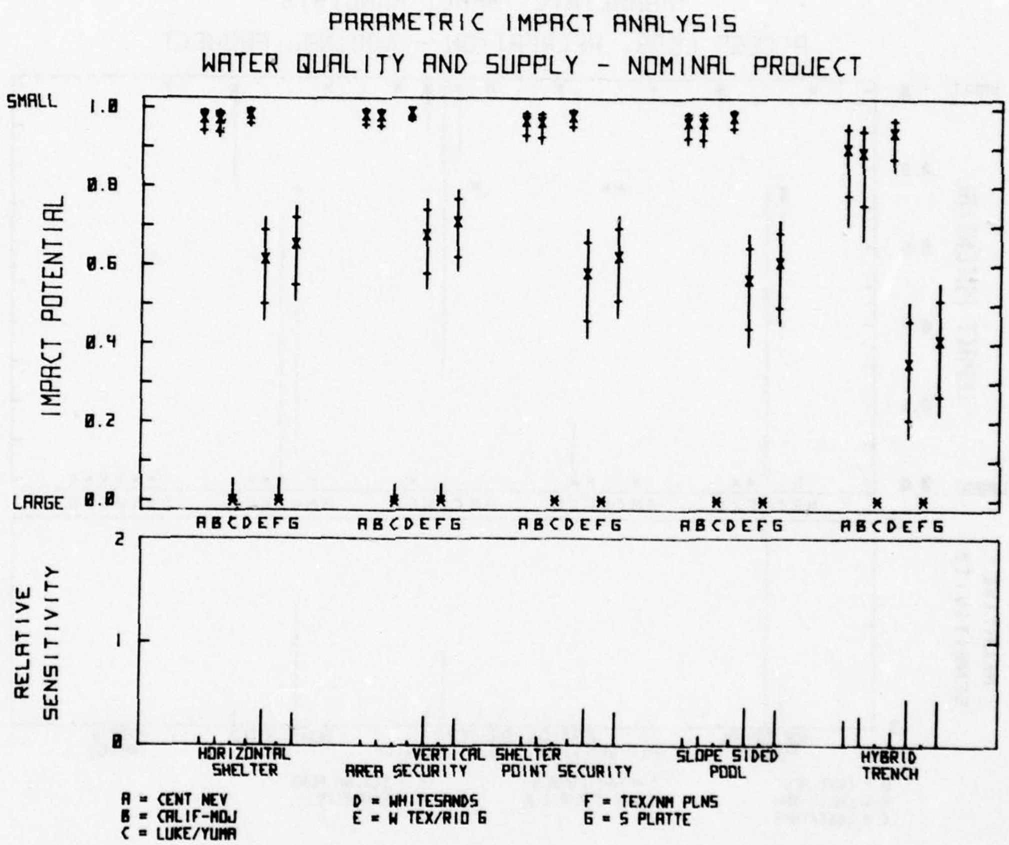
Figure B-2.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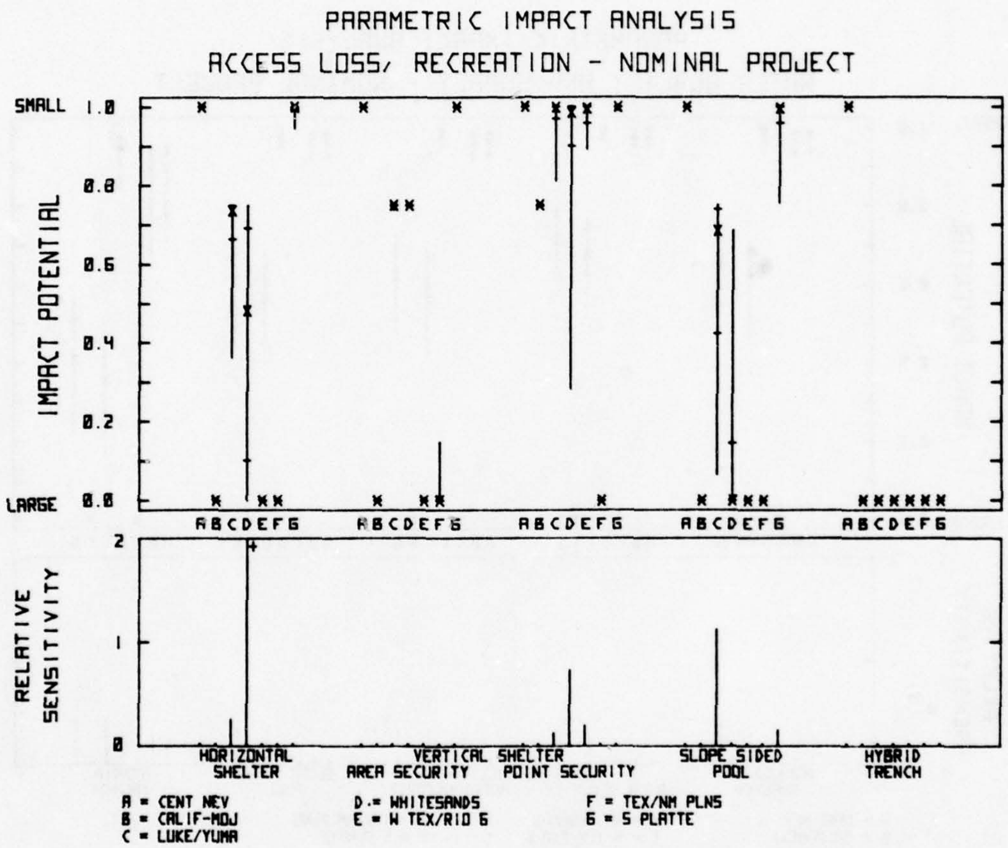
F = TEX/NM PLNS
G = S PLATTE

Figure B-3.


PARAMETRIC IMPACT ANALYSIS
ACCESS LOSS/ RECREATION - NOMINAL PROJECT
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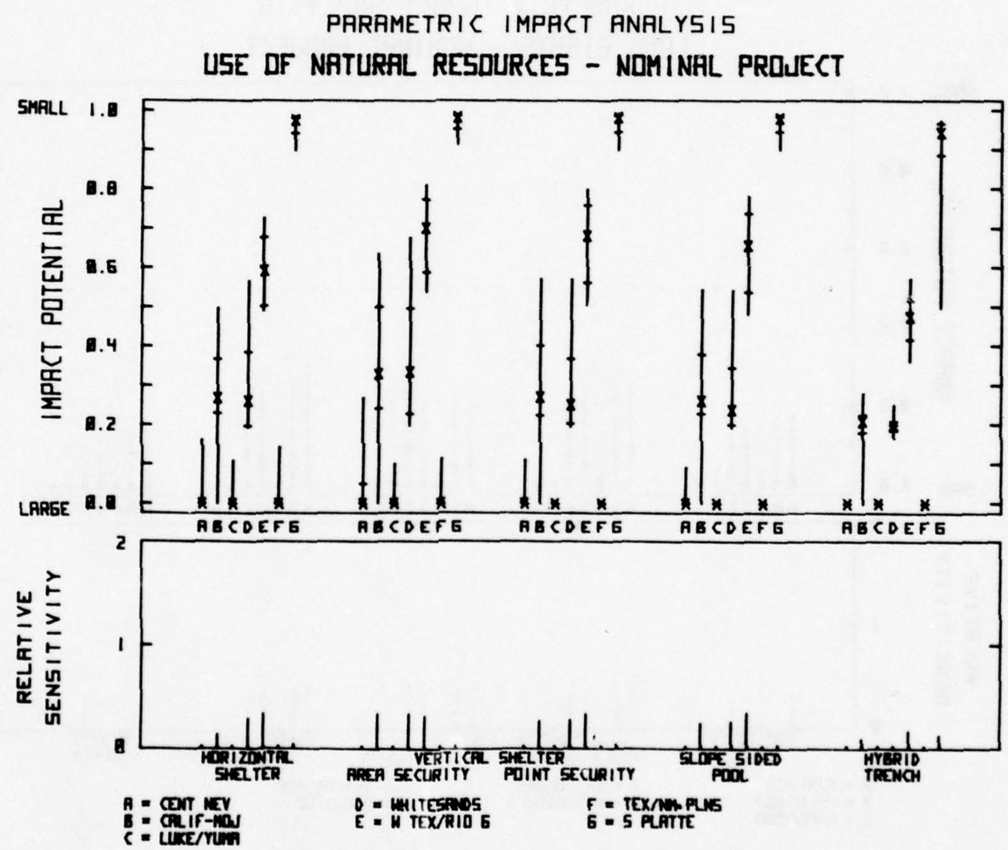
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-4.



PARAMETRIC IMPACT ANALYSIS
USE OF NATURAL RESOURCES - NOMINAL PROJECT
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-5.

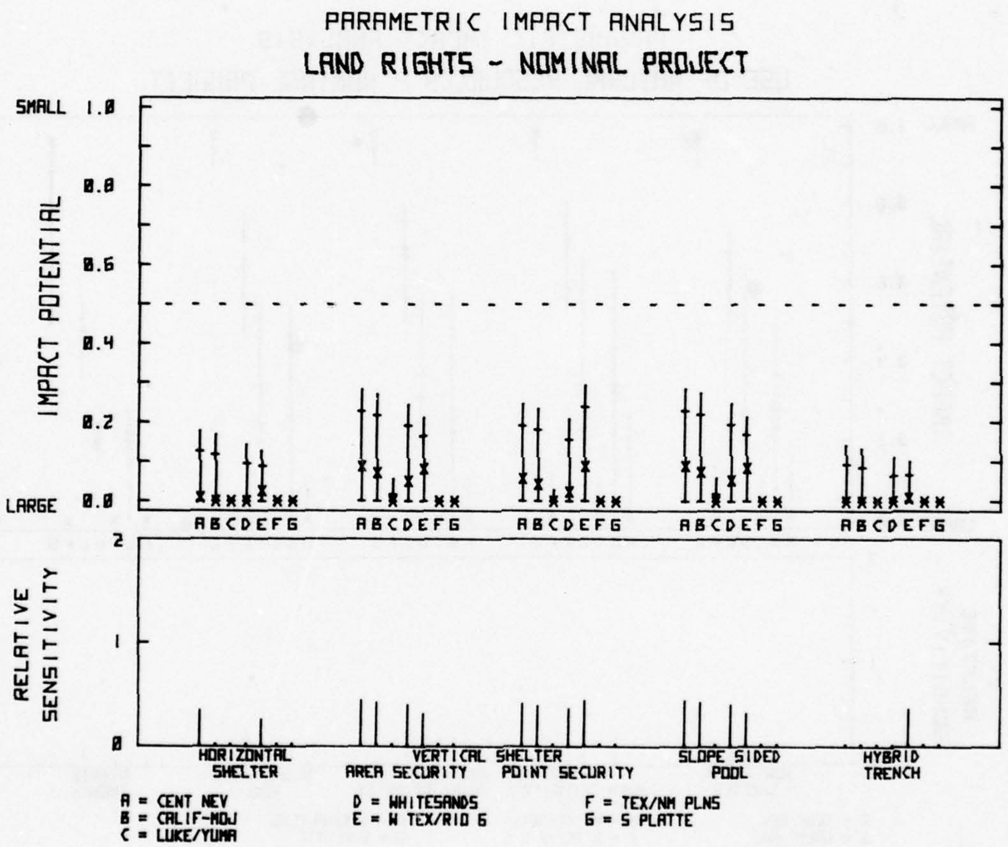
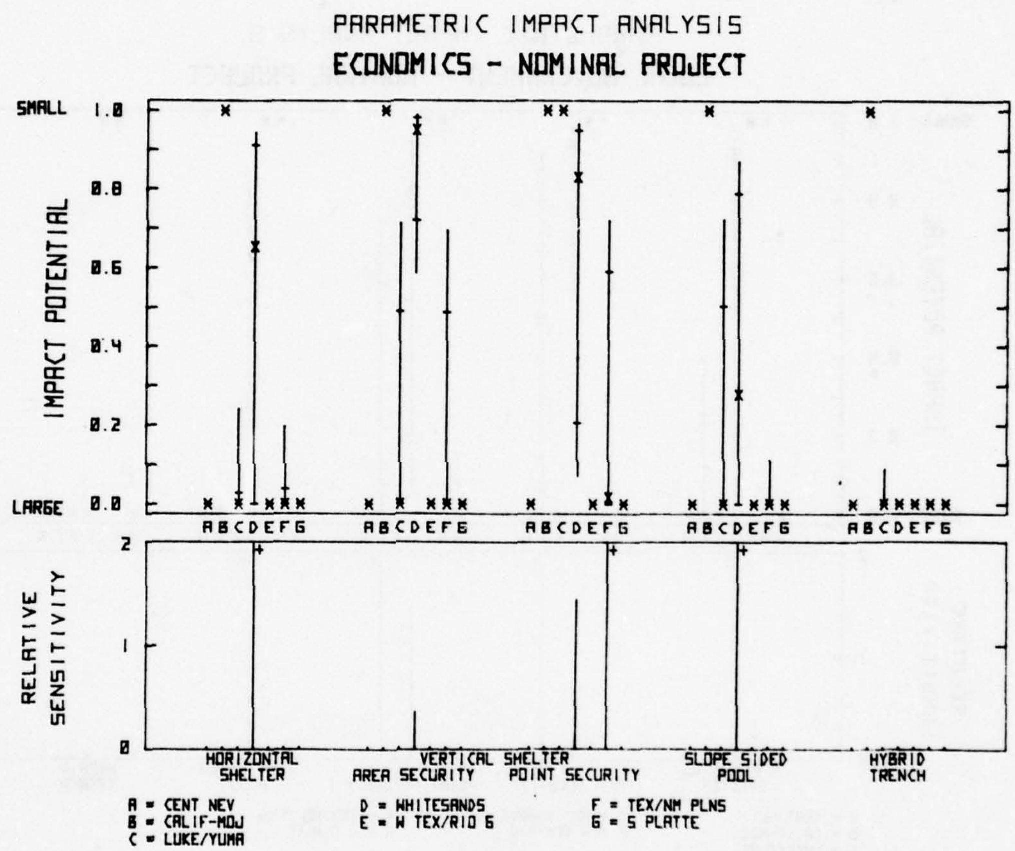

PARAMETRIC IMPACT ANALYSIS
LAND RIGHTS - NOMINAL PROJECT
SMALL
1.0
0.8
0.6
0.4
0.2
LARGE
0.0
IMPACT POTENTIAL
A B C D E F G
2
1
0
RELATIVE SENSITIVITY
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-6.



PARAMETRIC IMPACT ANALYSIS
ECONOMICS - NOMINAL PROJECT
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-7.

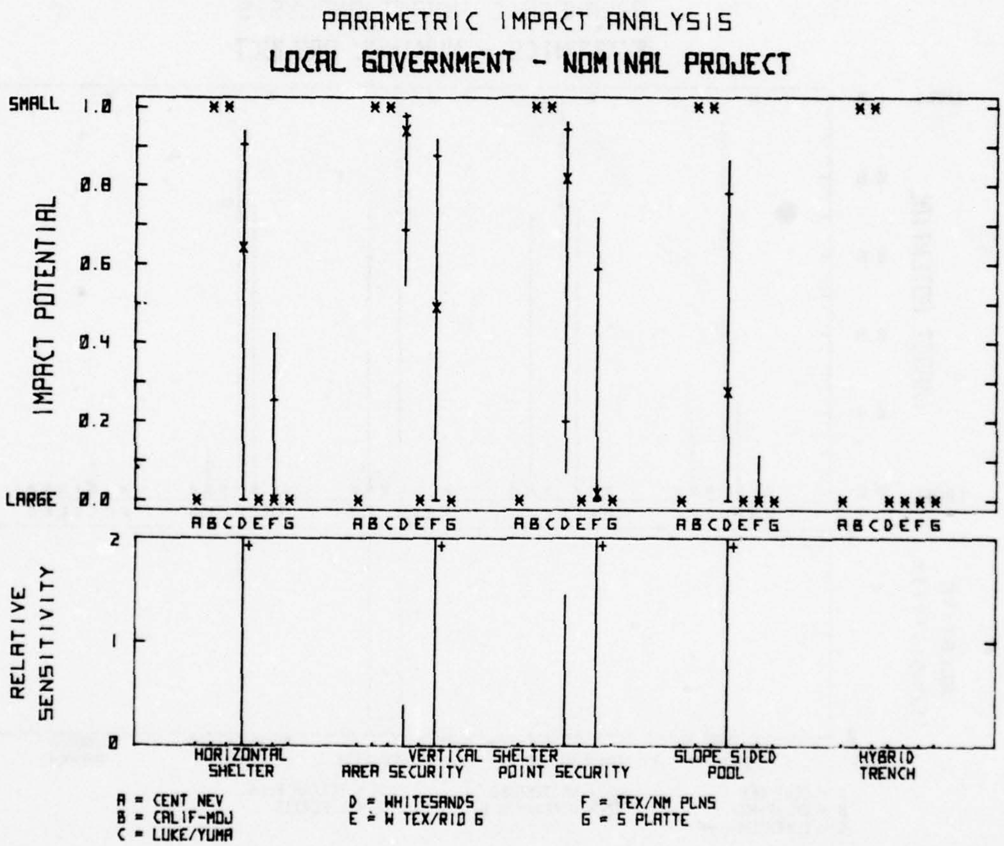

PARAMETRIC IMPACT ANALYSIS
LOCAL GOVERNMENT - NOMINAL PROJECT
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
VERTICAL SHELTER POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-8.

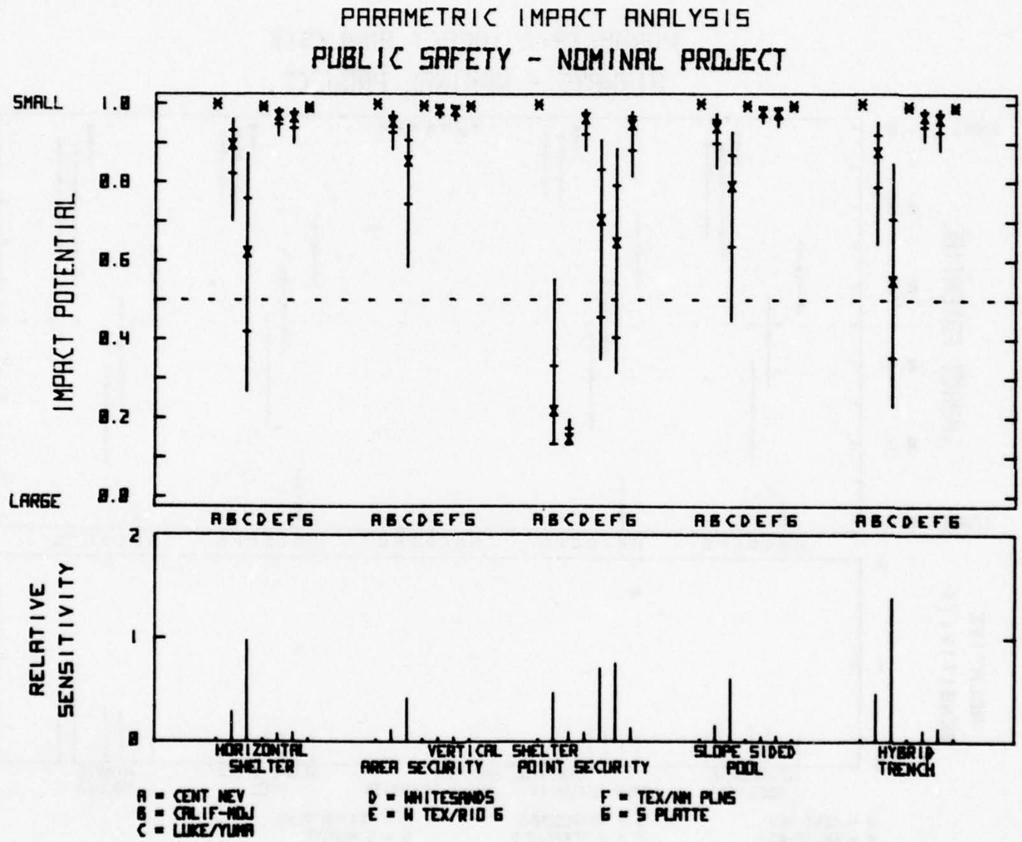

PARAMETRIC IMPACT ANALYSIS
PUBLIC SAFETY - NOMINAL PROJECT
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-ARIZ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-9.

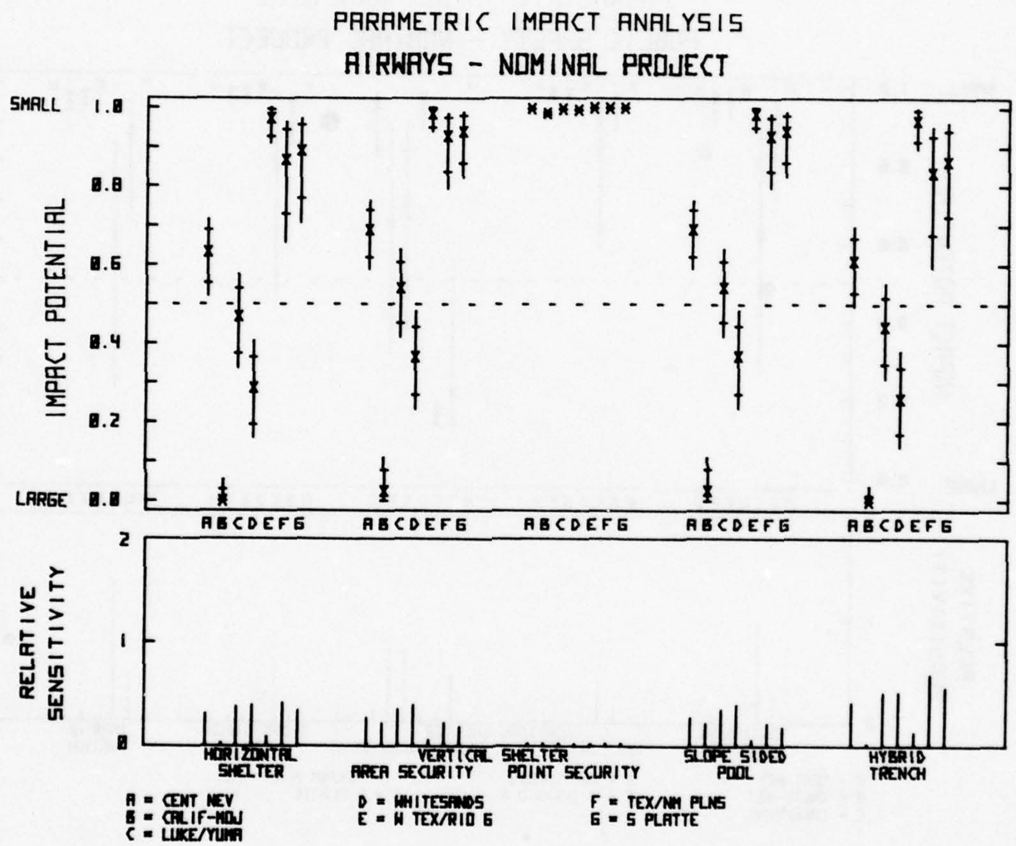

PARAMETRIC IMPACT ANALYSIS
AIRWAYS - NOMINAL PROJECT
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-10.

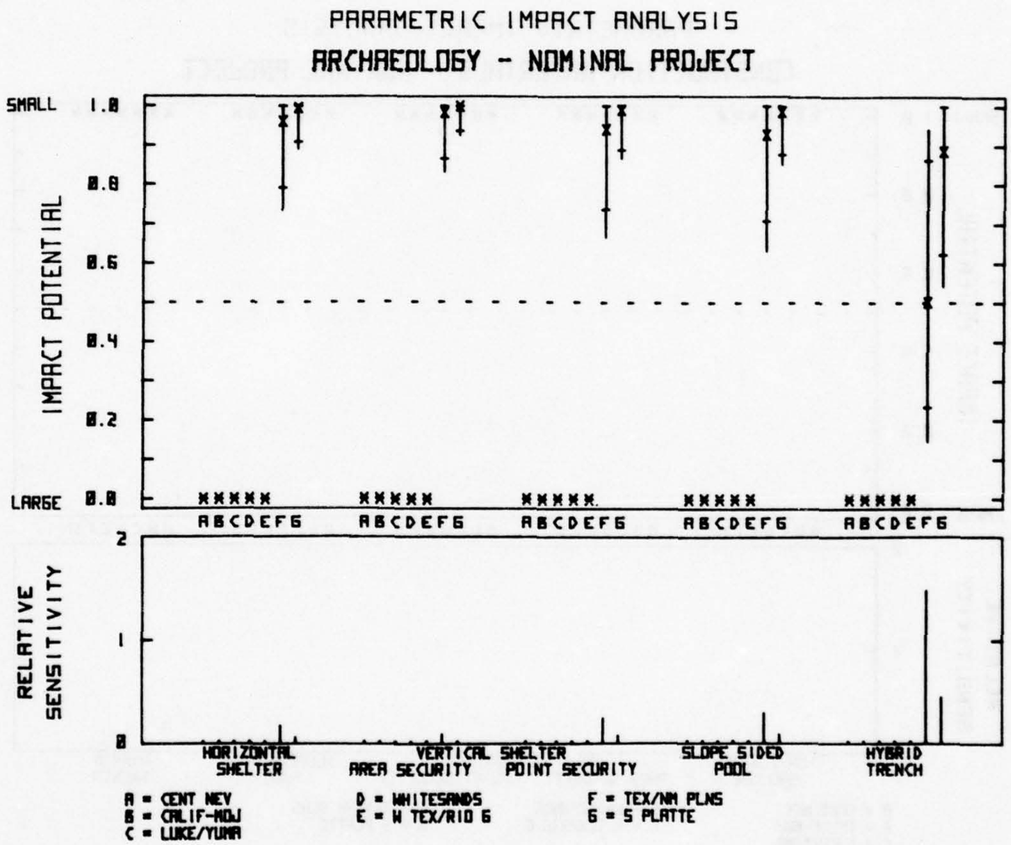

PARAMETRIC IMPACT ANALYSIS
ARCHAEOLOGY - NOMINAL PROJECT
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
VERTICAL SHELTER POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-11.

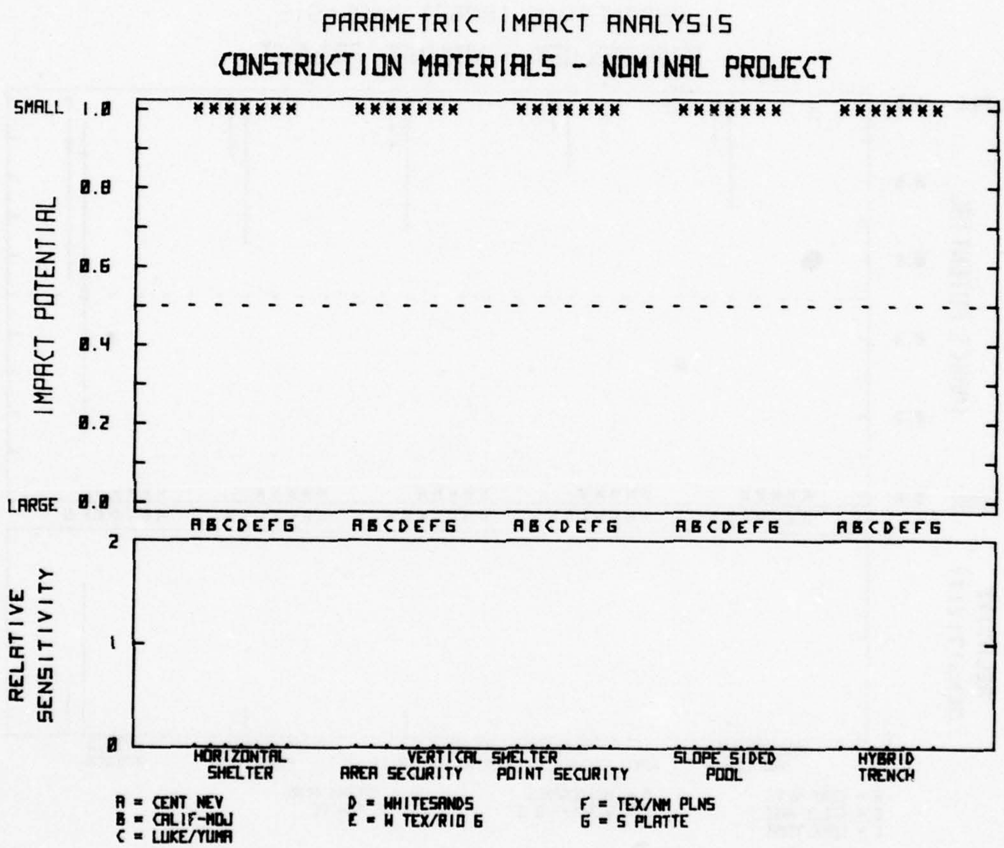
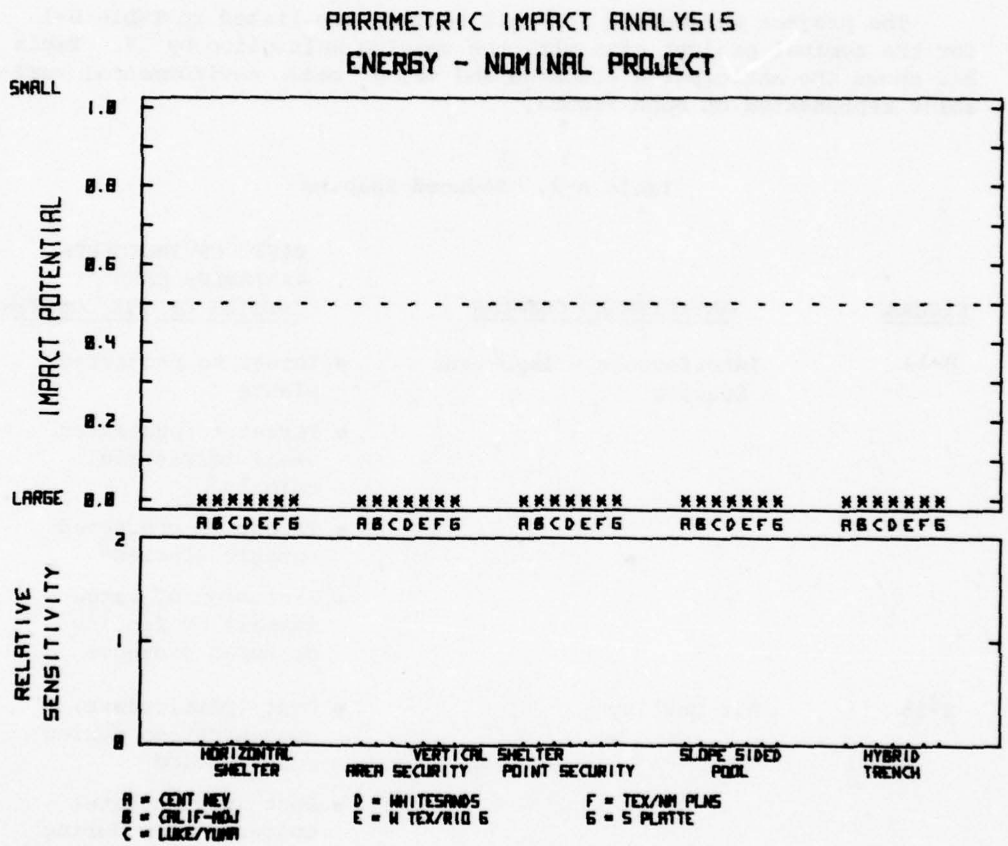

PARAMETRIC IMPACT ANALYSIS
CONSTRUCTION MATERIALS - NOMINAL PROJECT
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-12.



PARAMETRIC IMPACT ANALYSIS
ENERGY - NOMINAL PROJECT
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-13.

B.2 REDUCED SPACING BETWEEN AIMPOINTS

The project parameters for this section are listed in Table B-1 for the nominal project size with the spacing multiplied by .7. Table B-2 shows the anticipated concerns and set of basic environmental variables represented on each figure.

Table B-2. Reduced Spacing

FIGURE	ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
B-14	Interference - Important Species	• Threat to protected plants • Threat to protected small terrestrial animals • Threat to protected aquatic species • Exclusion of large mammals by fencing or human presence
B-15	Air Quality	• Dust (particulate) concentration during construction • Dust (particulate) concentration during operation • Nitrogen oxide concentration during construction • Sulfur dioxide construction • Reactive hydrocarbon concentration during construction

Table B-2 (continued)

FIGURE	ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
		• Carbon monoxide concentrations during construction • Potential for erosion
B-16	Water Quality & Supply	• Water available/water required for ten years of operation • Potential for erosion (sedimentation)
B-17	Land Access Loss	• Highway congestion during construction • Highway congestion during operation • Public lands required not currently under Department of Defense withdrawal
B-18	Use of Natural Resources	• Existing level of aesthetic degradation • Loss of natural habitat • Loss of vegetative cover • Dust (particulate) concentrations during construction • Dust (particulate) concentration during operation • Water available/water required for 10 years operation
B-19	Land Rights Issues	• Inhabitants displaced • Private land required

Table B-2 (continued)

FIGURE	ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
B-20	Economic Issues	• Jobs for local residents - construction (BMCA) • Jobs for local residents - construction (EEP) • Jobs for local residents - operation (BMCA) • Jobs for local residents - operation (EEP) • Change in public expenditures - construction • Change in public expenditures - operation • Agriculture production lost • Mining revenues lost
B-21	Local Government Issues	• Resident population inmigration-construction (BMCA) • Resident population inmigration-operation (BMCA) • Nonresident population inmigration-construction (BMCA) • Nonresident population inmigration-operation (BMCA) • Change in public expenditures - construction • Change in public expenditures - operation • New housing units - construction

Table B-2 (continued)

FIGURE	ANTICIPATED CONCERN	BASIC ENVIRONMENTAL VARIABLES USED AS INDICES OF THE CONCERN
		• New housing units - operation
B-22	Public Safety Issues	• Nuclear target concern
		• Nuclear accident concern
B-23	Transportation Issues	• Airways impeded
B-24	Archaeology	• Archaeological effect
B-25	Construction Materials	• Cement required
B-26	Energy	• Electric Energy required

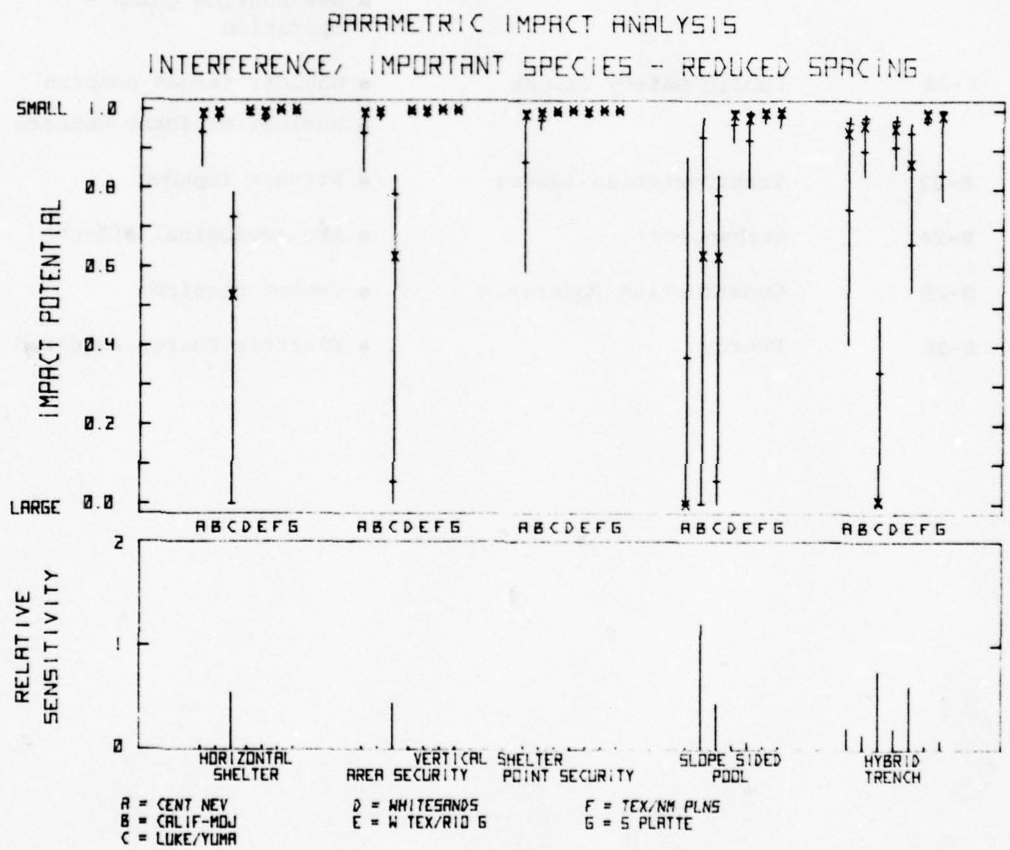

PARAMETRIC IMPACT ANALYSIS
INTERFERENCE, IMPORTANT SPECIES - REDUCED SPACING
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-14.

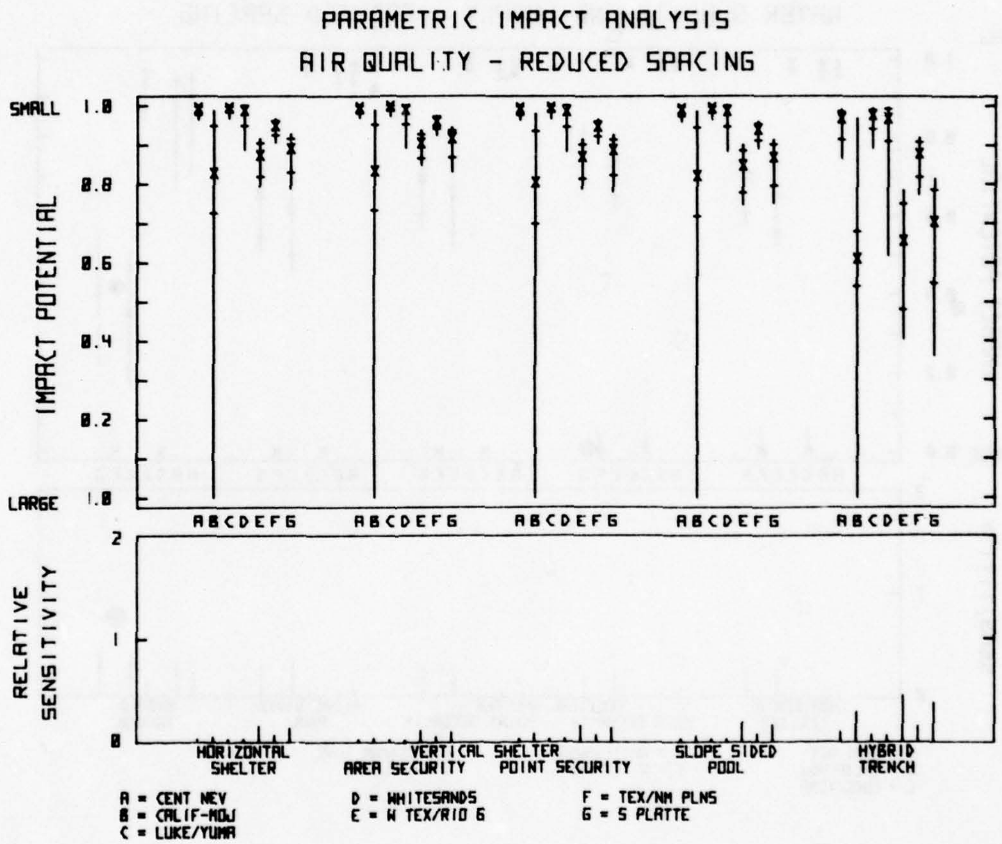

PARAMETRIC IMPACT ANALYSIS
AIR QUALITY - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
1.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-15.

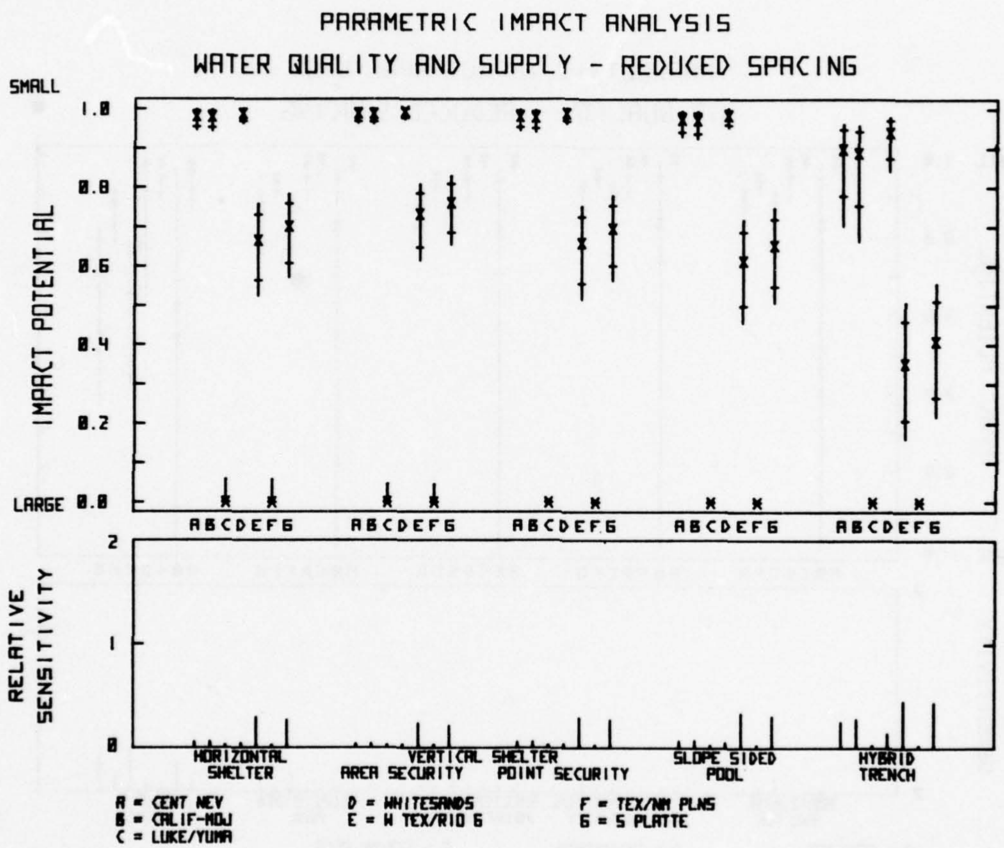

PARAMETRIC IMPACT ANALYSIS
WATER QUALITY AND SUPPLY - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
RELATIVE SENSITIVITY
ABCDEFG
HORIZONTAL SHELTER
AREA SECURITY
VERTICAL SHELTER
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-16.

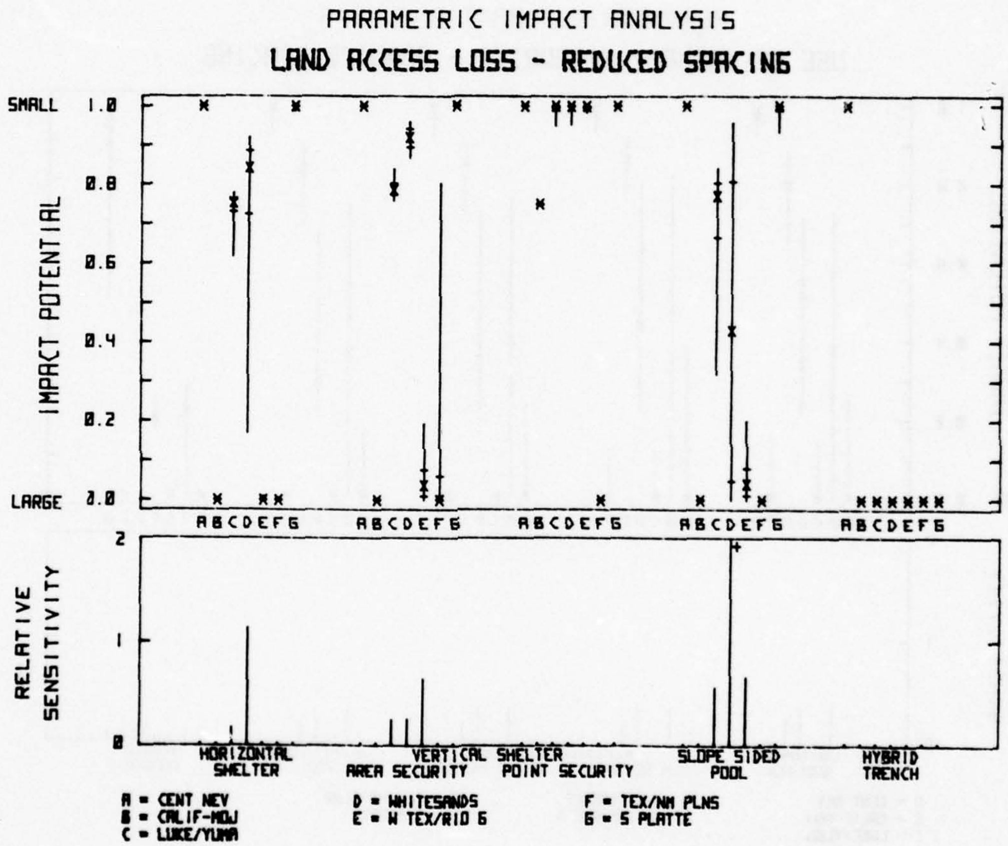

PARAMETRIC IMPACT ANALYSIS
LAND ACCESS LOSS - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-17.

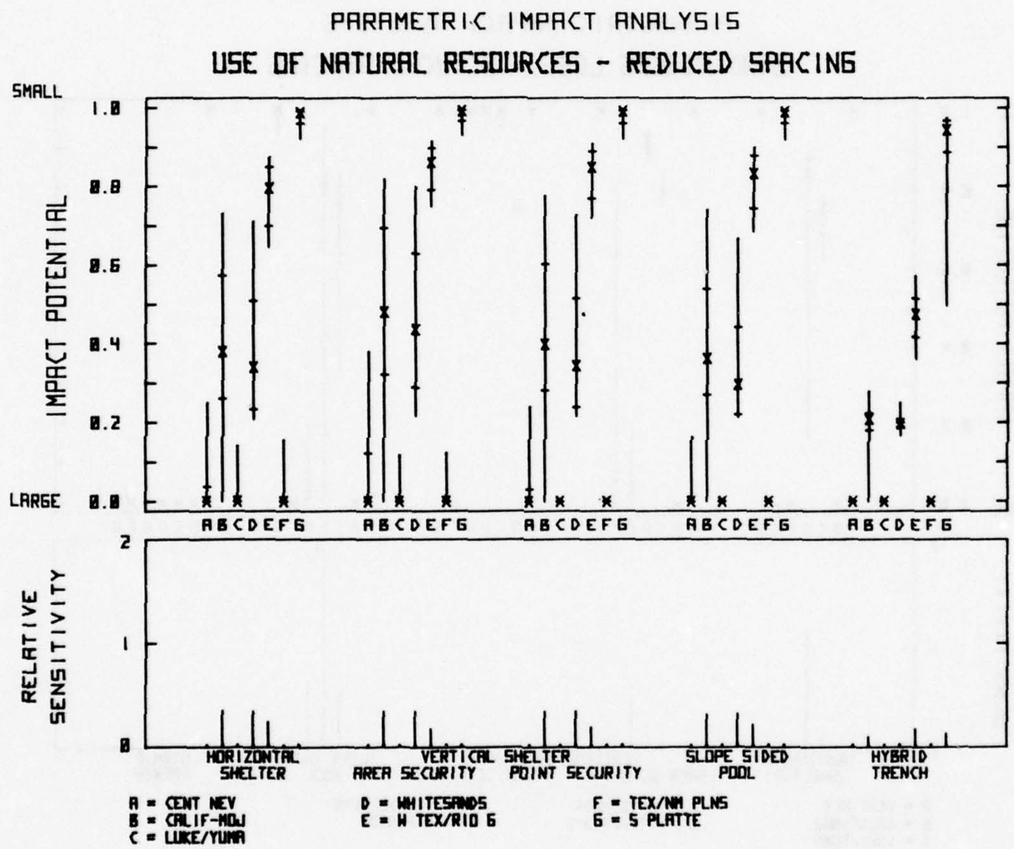

PARAMETRIC IMPACT ANALYSIS
USE OF NATURAL RESOURCES - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-18.

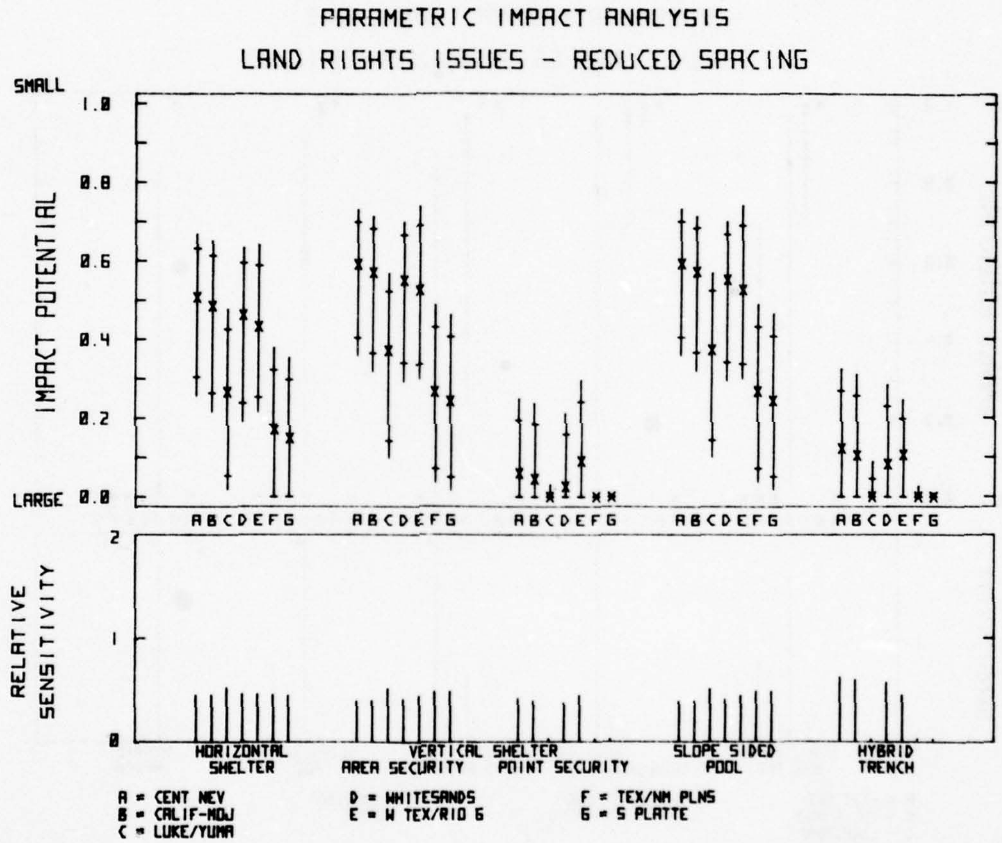

PARAMETRIC IMPACT ANALYSIS
LAND RIGHTS ISSUES - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-19.

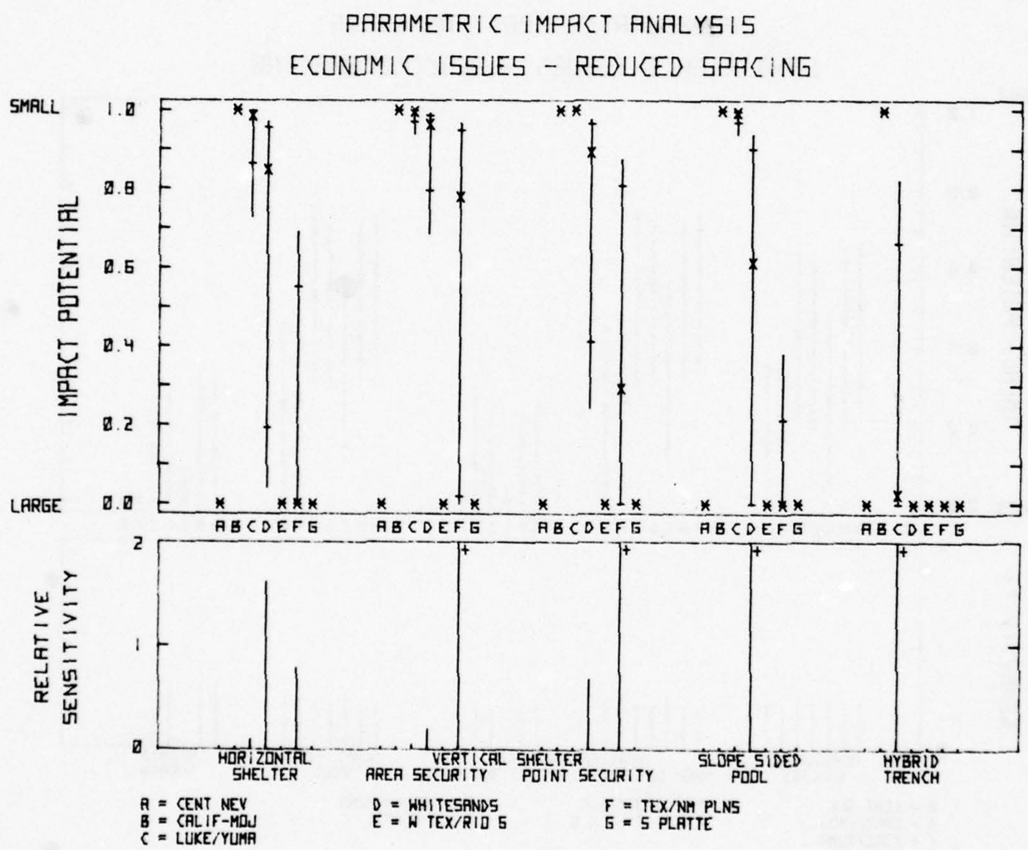
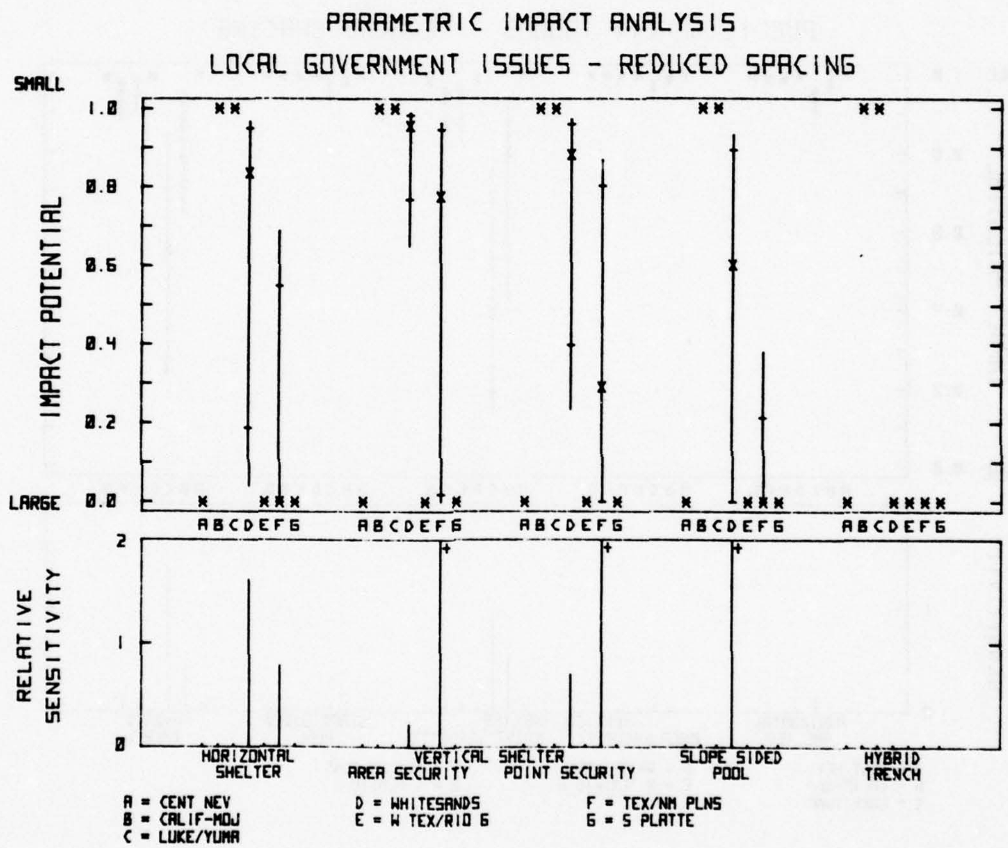

PARAMETRIC IMPACT ANALYSIS
ECONOMIC ISSUES - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-20.



PARAMETRIC IMPACT ANALYSIS
LOCAL GOVERNMENT ISSUES - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
VERTICAL SHELTER POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-21.

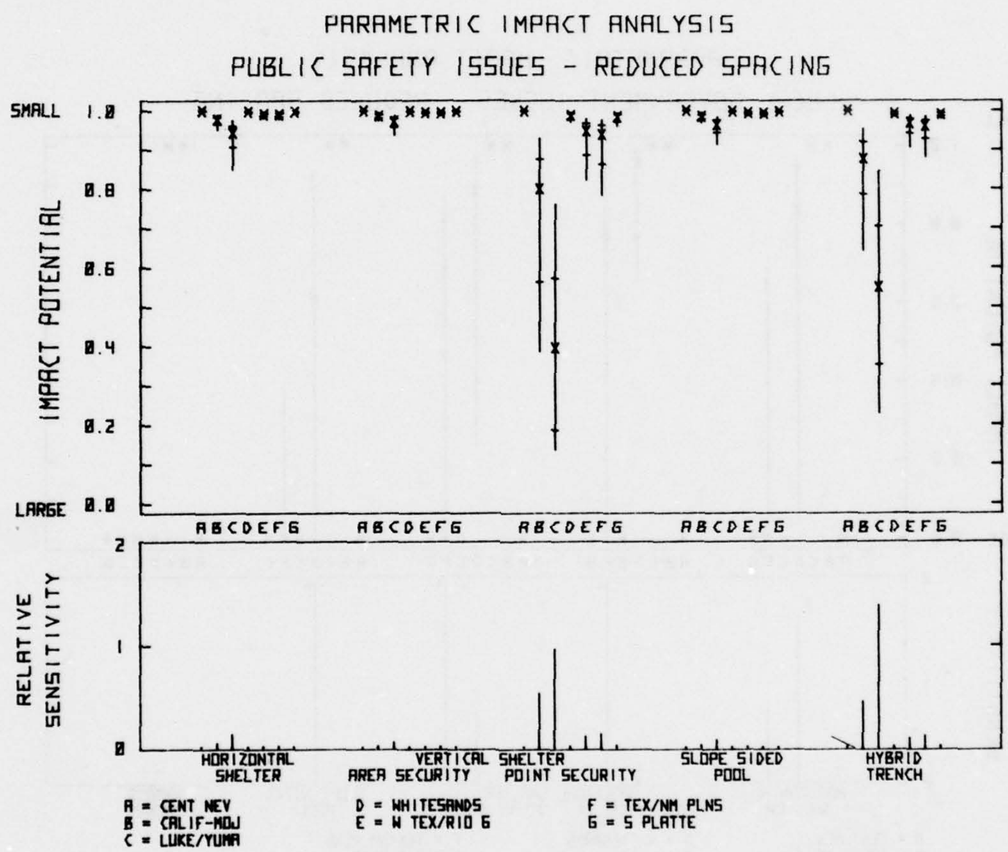

PARAMETRIC IMPACT ANALYSIS
PUBLIC SAFETY ISSUES - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
VERTICAL SHELTER POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-22.

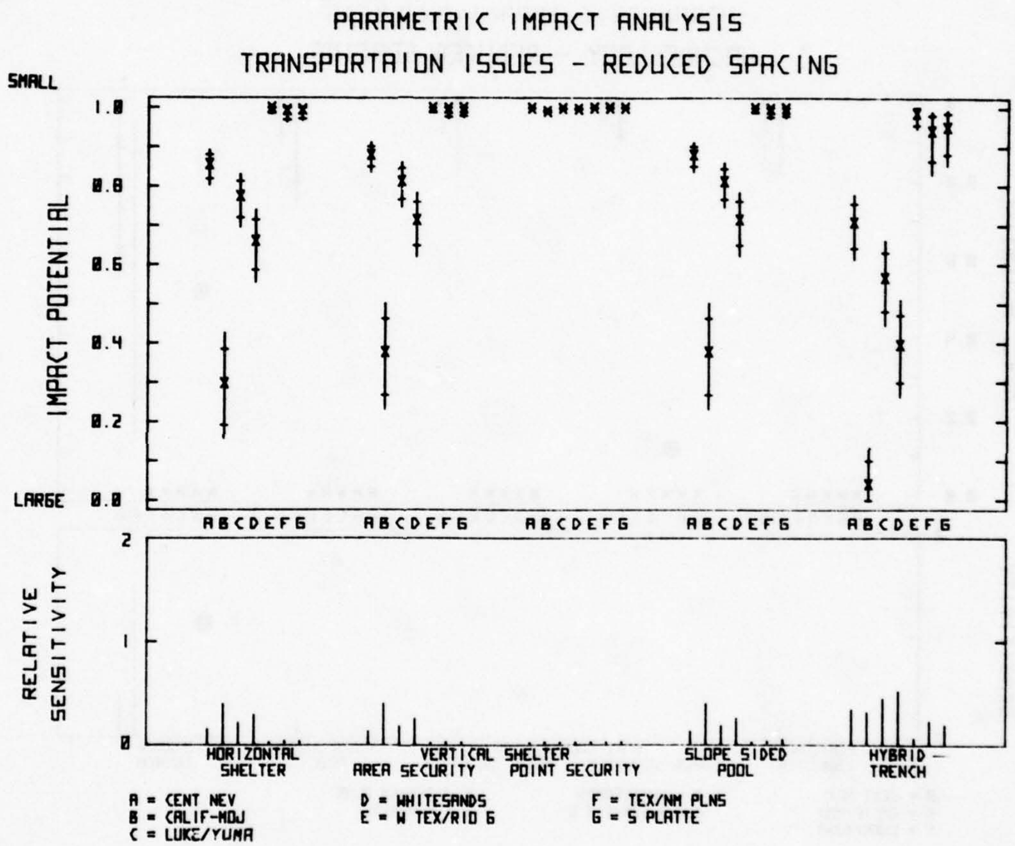

PARAMETRIC IMPACT ANALYSIS
TRANSPORTAION ISSUES - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG ABCDEFG ABCDEFG ABCDEFG ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID — TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-23.

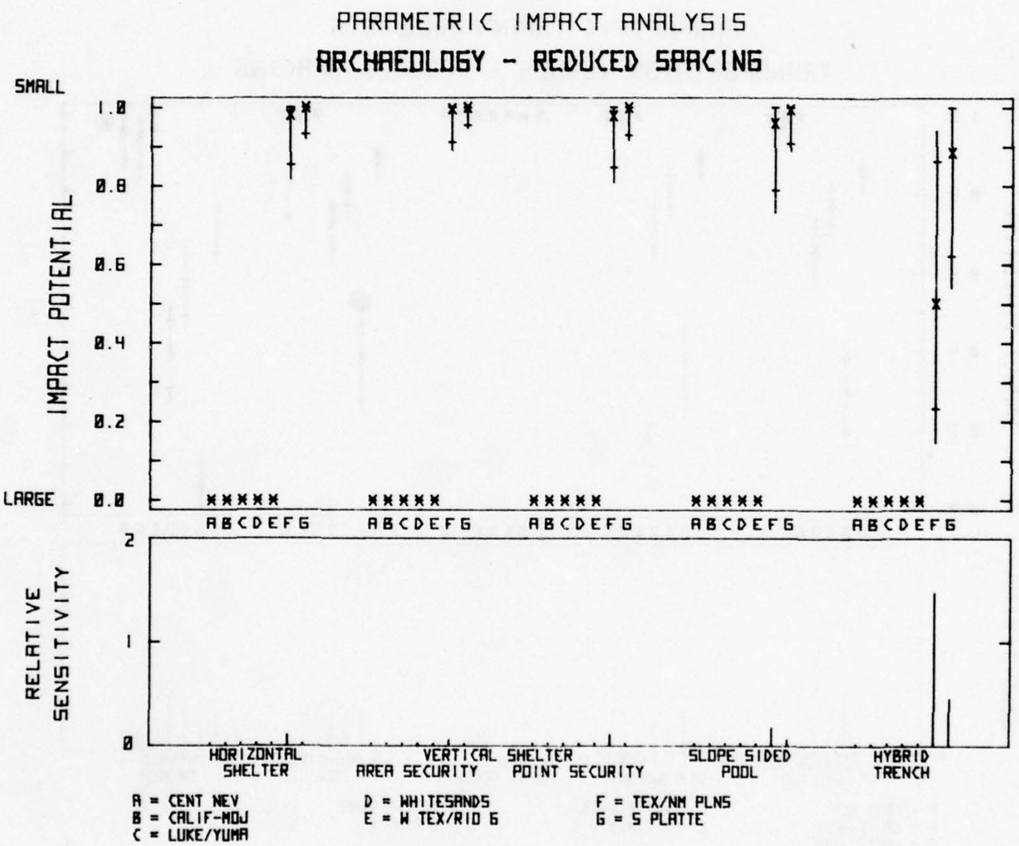

PARAMETRIC IMPACT ANALYSIS
ARCHAEOLOGY - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
AREA SECURITY
VERTICAL SHELTER
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-24.

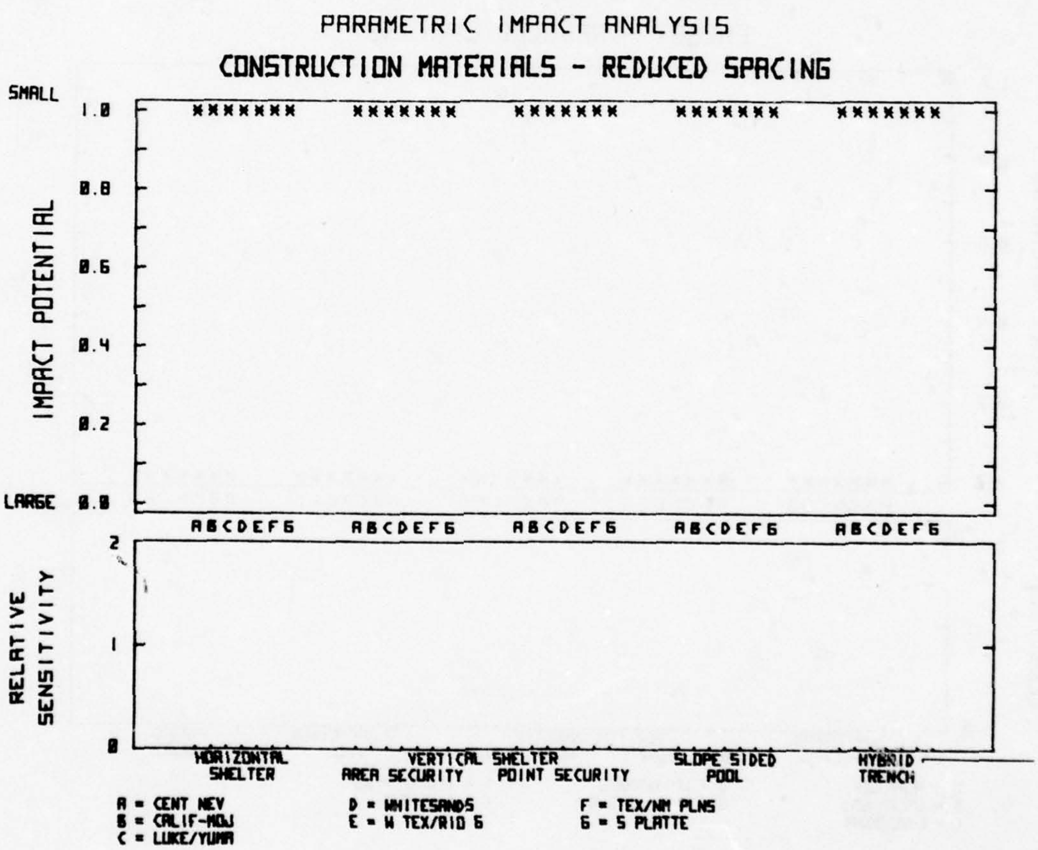

PARAMETRIC IMPACT ANALYSIS
CONSTRUCTION MATERIALS - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-25.

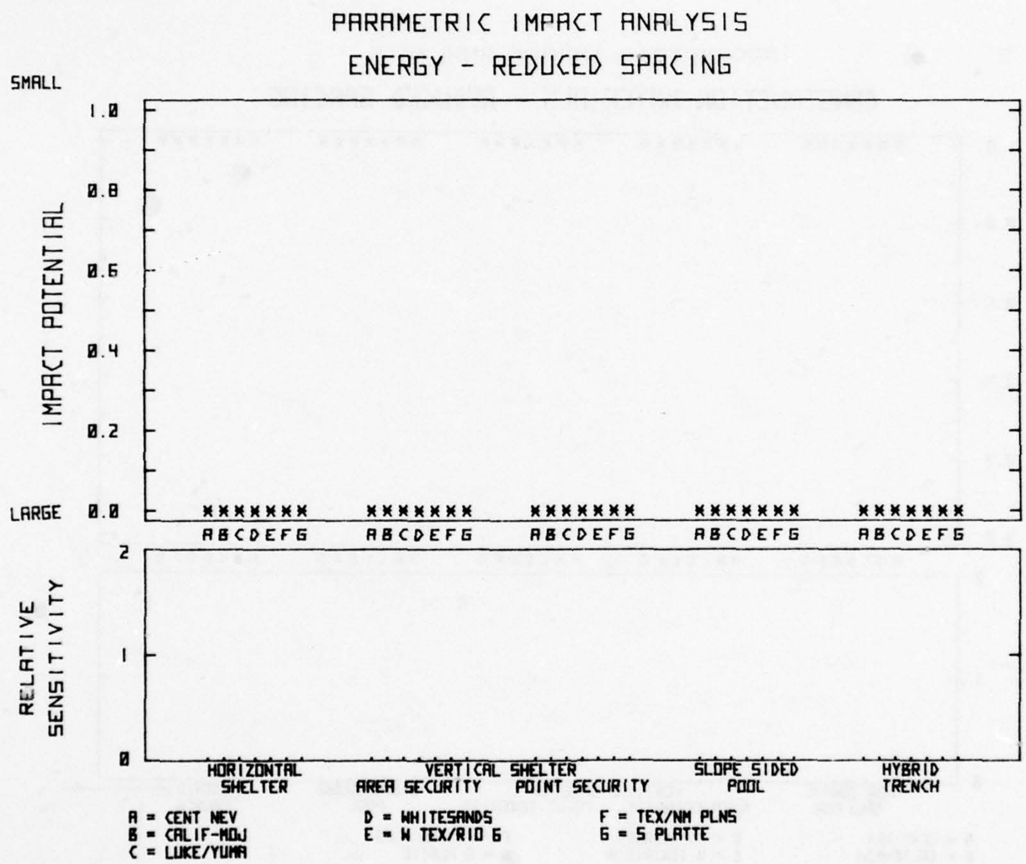

PARAMETRIC IMPACT ANALYSIS
ENERGY - REDUCED SPACING
SMALL
LARGE
IMPACT POTENTIAL
1.0
0.8
0.6
0.4
0.2
0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
AREA SECURITY
POINT SECURITY
SLOPE SIDED POOL
HYBRID TRENCH
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-26.

B.3 ENVIRONMENTAL IMPACT POTENTIALS FOR EACH OF THE INDIVIDUAL ENVIRONMENTAL EFFECTS

Table 3-3 of Vol. IV lists the Basic Environmental Variables and show how they are combined into Anticipated Concerns. Section 3.1 of Vol. IV explains the derivation of the bar charts. The Appendix of Vol. IV contains the Anticipated Concern Bar Charts. The variables listed include results associated with a full force with both area and point security and reduced forces of two-thirds and one-third of the full force.

The basic Environmental Variable Bar Charts are displayed with both nominal and expanded spacing on each figure in the following arrangement. Displayed in each chart is the range of impact potential levels associated with each of the listed environmental effects variables for each of the BMCAs studied.

Variable	Configuration	Figure
Jobs for Local Residents-Construction (BMCA)	Full Force-Area Security	B-27
	-Point Security	B-28
	2/3 Force -Area Security	B-29
	-Point Security	B-30
	1/3 Force -Area Security	B-31
	-Point Security	B-32
Jobs for Local Residents-Construction (EEP)	Full Force-Area Security	B-33
	-Point Security	B-34
	2/3 Force -Area Security	B-35
	-Point Security	B-36
	1/3 Force -Area Security	B-37
	-Point Security	B-38
Jobs for Local Residents-Operation (BMCA)	Full Force-Area Security	B-39
	-Point Security	B-40

Variable	Configuration	Figure
	2/3 Force-Area Security	B-41
	-Point Security	B-42
	1/3 Force-Area Security	B-43
	-Point Security	B-44
Jobs for Local Residents-Operation (EEP)	Full Force-Area Security	B-45
	-Point Security	B-46
	2/3 Force -Area Security	B-47
	-Point Security	B-48
	1/3 Force -Area Security	B-49
	-Point Security	B-50
Resident Population In-Migration (Construction)	Full Force-Area Security	B-51
	-Point Security	B-52
	2/3 Force -Area Security	B-53
	-Point Security	B-54
	1/3 Force -Area Security	B-55
	-Point Security	B-56
Resident Population In-Migration (Operation)	Full Force-Area Security	B-57
	-Point Security	B-58
	2/3 Force -Area Security	B-59
	-Point Security	B-60
	1/3 Force -Area Security	B-61
	-Point Security	B-62
Non-Resident Population In-Migration (Construction)	Full Force-Area Security	B-63
	-Point Security	B-64
	2/3 Force -Area Security	B-65
	-Point Security	B-66
	1/3 Force -Area Security	B-67
	-Point Security	B-68

Variable	Configuration	Figure
Non-Resident Population In-Migration (Operation)	Full Force-Area Security	B-69
	-Point Security	B-70
	2/3 Force -Area Security	B-71
	-Point Security	B-72
	1/3 Force -Area Security	B-73
	-Point Security	B-74
Highway Congestion (Construction)	Full Force-Area Security	B-75
	-Point Security	B-76
	2/3 Force -Area Security	B-77
	-Point Security	B-78
	1/3 Force -Area Security	B-79
	-Point Security	B-80
Highway Congestion (Operation)	Full Force-Area Security	B-81
	-Point Security	B-82
	2/3 Force -Area Security	B-83
	-Point Security	B-84
	1/3 Force -Area Security	B-85
	-Point Security	B-86
Change in Public Expenditures (Construction)	Full Force-Area Security	B-87
	-Point Security	B-88
	2/3 Force -Area Security	B-89
	-Point Security	B-90
	1/3 Force -Area Security	B-91
	-Point Security	B-92
Change in Public Expenditures (Operation)	Full Force-Area Security	B-93
	-Point Security	B-94
	2/3 Force -Area Security	B-95
	-Point Security	B-96
	1/3 Force -Area Security	B-97
	-Point Security	B-98

Variable	Configuration		Figure
New Housing Units (Construction)	Full Force	- Area Security	B-99
		- Point Security	B-100
	2/3 Force	- Area Security	B-101
		- Point Security	B-102
	1/3 Force	- Area Security	B-103
		- Point Security	B-104
New Housing Units (Operation)	Full Force	- Area Security	B-105
		- Point Security	B-106
	2/3 Force	- Area Security	B-107
		- Point Security	B-108
	1/3 Force	- Area Security	B-109
		- Point Security	B-110
Inhabitants Displaced	Full Force	- Area Security	B-111
		- Point Security	B-112
	2/3 Force	- Area Security	B-113
		- Point Security	B-114
	1/3 Force	- Area Security	B-115
		- Point Security	B-116
Agriculture Production Lost	Full Force	- Area Security	B-117
		- Point Security	B-118
	2/3 Force	- Area Security	B-119
		- Point Security	B-120
	1/3 Force	- Area Security	B-121
		- Point Security	B-122
Archaeological Effect	Full Force	- Area Security	B-123
		- Point Security	B-124
	2/3 Force	- Area Security	B-125
		- Point Security	B-126
	1/3 Force	- Area Security	B-127
		- Point Security	B-128

Variable	Configuration		Figure
Private Land Required	Full Force	- Area Security	B-129
		- Point Security	B-130
	2/3 Force	- Area Security	B-131
		- Point Security	B-132
	1/3 Force	- Area Security	B-133
		- Point Security	B-134
Electric Energy Required	Full Force	- Area Security	B-135
		- Point Security	B-136
	2/3 Force	- Area Security	B-137
		- Point Security	B-138
	1/3 Force	- Area Security	B-139
		- Point Security	B-140
Cement Required	Full Force	- Area Security	B-141
		- Point Security	B-142
	2/3 Force	- Area Security	B-143
		- Point Security	B-144
	1/3 Force	- Area Security	B-145
		- Point Security	B-146
Airways Impeded	Full Force	- Area Security	B-147
		- Point Security	B-148
	2/3 Force	- Area Security	B-149
		- Point Security	B-150
	1/3 Force	- Area Security	B-151
		- Point Security	B-152
Loss of Natural Habitat	Full Force	- Area Security	B-153
		- Point Security	B-154
	2/3 Force	- Area Security	B-155
		- Point Security	B-156
	1/3 Force	- Area Security	B-157
		- Point Security	B-158

Variable	Configuration	Figure
Loss of Vegetative Cover	Full Force - Area Security	B-159
	- Point Security	B-160
	2/3 Force - Area Security	B-161
	- Point Security	B-162
	1/3 Force - Area Security	B-163
	- Point Security	B-164
Threat to Protected Plants	Full Force - Area Security	B-165
	- Point Security	B-166
	2/3 Force - Area Security	B-167
	- Point Security	B-168
	1/3 Force - Area Security	B-169
	- Point Security	B-170
Threat to Protected Small Terrestrial Animals	Full Force - Area Security	B-171
	- Point Security	B-172
	2/3 Force - Area Security	B-173
	- Point Security	B-174
	1/3 Force - Area Security	B-175
	- Point Security	B-176
Exclusion of Large Mammals by Fencing	Full Force - Area Security	B-177
	- Point Security	B-178
	2/3 Force - Area Security	B-179
	- Point Security	B-180
	1/3 Force - Area Security	B-181
	- Point Security	B-182
Threat to Protected Aquatic Species	Full Force - Area Security	B-183
	- Point Security	B-184
	2/3 Force - Area Security	B-185
	- Point Security	B-186
	1/3 Force - Area Security	B-187
	- Point Security	B-188
Dust Concentration (Construction)	Full Force - Area Security	B-189
	- Point Security	B-190

Variable	Configuration	Figure
	2/3 Force - Area Security	B-191
	- Point Security	B-192
	1/3 Force - Area Security	B-193
	- Point Security	B-194
Dust Concentration (Construction)	Full Force- Area Security	B-195
	- Point Security	B-196
	2/3 Force - Area Security	B-197
	- Point Security	B-198
	1/3 Force - Area Security	B-199
	- Point Security	B-200
Water Required (Construction + 10 years)	Full Force- Area Security	B-201
	- Point Security	B-202
	2/3 Force - Area Security	B-203
	- Point Security	B-204
	1/3 Force - Area Security	B-205
	- Point Security	B-206
Aesthetic Degradation	Full Force- Area Security	B-207
	- Point Security	B-208
	2/3 Force - Area Security	B-209
	- Point Security	B-210
	1/3 Force - Area Security	B-211
	- Point Security	B-212
Erosion Potential	Full Force- Area Security	B-213
	- Point Security	B-214
	2/3 Force - Area Security	B-215
	- Point Security	B-216
	1/3 Force - Area Security	B-217
	- Point Security	B-218
Mining Revenues Lost	Full Force- Area Security	B-219
	- Point Security	B-220

Variable	Configuration	Figure
	2/3 Force - Area Security	B-221
	- Point Security	B-222
	1/3 Force - Area Security	B-223
	- Point Security	B-224
Public (Non-DOD) Lands required	Full Force- Area Security	B-225
	Point Security	B-226
	2/3 Force - Area Security	B-227
	- Point Security	B-228
	1/3 Force - Area Security	B-229
	- Point Security	B-230
Nitrogen Oxide Concentration (Construction)	Full Force- Area Security	B-231
	- Point Security	B-232
	2/3 Force - Area Security	B-233
	- Point Security	B-234
	1/3 Force - Area Security	B-235
	- Point Security	B-236
Sulfur Dioxide Concentration (Construction)	Full Force- Area Security	B-237
	- Point Security	B-238
	2/3 Force - Area Security	B-239
	- Point Security	B-240
	1/3 Force - Area Security	B-241
	- Point Security	B-242
Hydrocarbon Concentration (Construction)	Full Force- Area Security	B-243
	- Point Security	B-244
	2/3 Force - Area Security	B-245
	- Point Security	B-246
	1/3 Force - Area Security	B-247
	- Point Security	B-248

Variable	Configuration		Figure
Carbon Monoxide Concentration (Construction)	Full Force	- Area Security	B-249
		- Point Security	B-250
	2/3 Force	- Area Security	B-251
		- Point Security	B-252
	1/3 Force	- Area Security	B-253
		- Point Security	B-254
Nuclear Target Concern	Full Force	- Area Security	B-255
		- Point Security	B-256
	2/3 Force	- Area Security	B-257
		- Point Security	B-258
	1/3 Force	- Area Security	B-259
		- Point Security	B-260
Nuclear Accident Concern	Full Force	- Area Security	B-261
		- Point Security	B-262
	2/3 Force	- Area Security	B-263
		- Point Security	B-264
	1/3 Force	- Area Security	B-265
		- Point Security	B-266

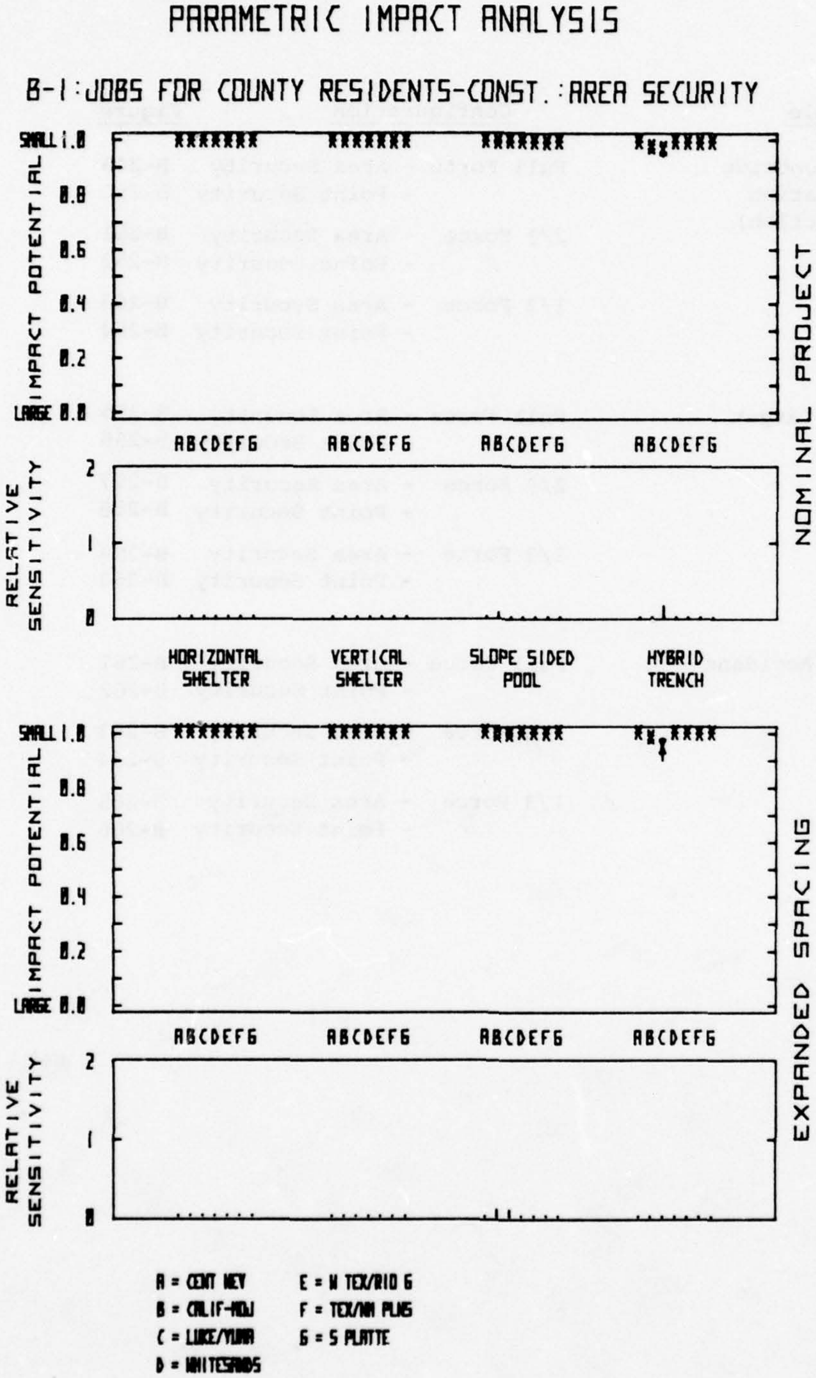

PARAMETRIC IMPACT ANALYSIS
B-1:JOBS FOR COUNTY RESIDENTS-CONST.:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-27

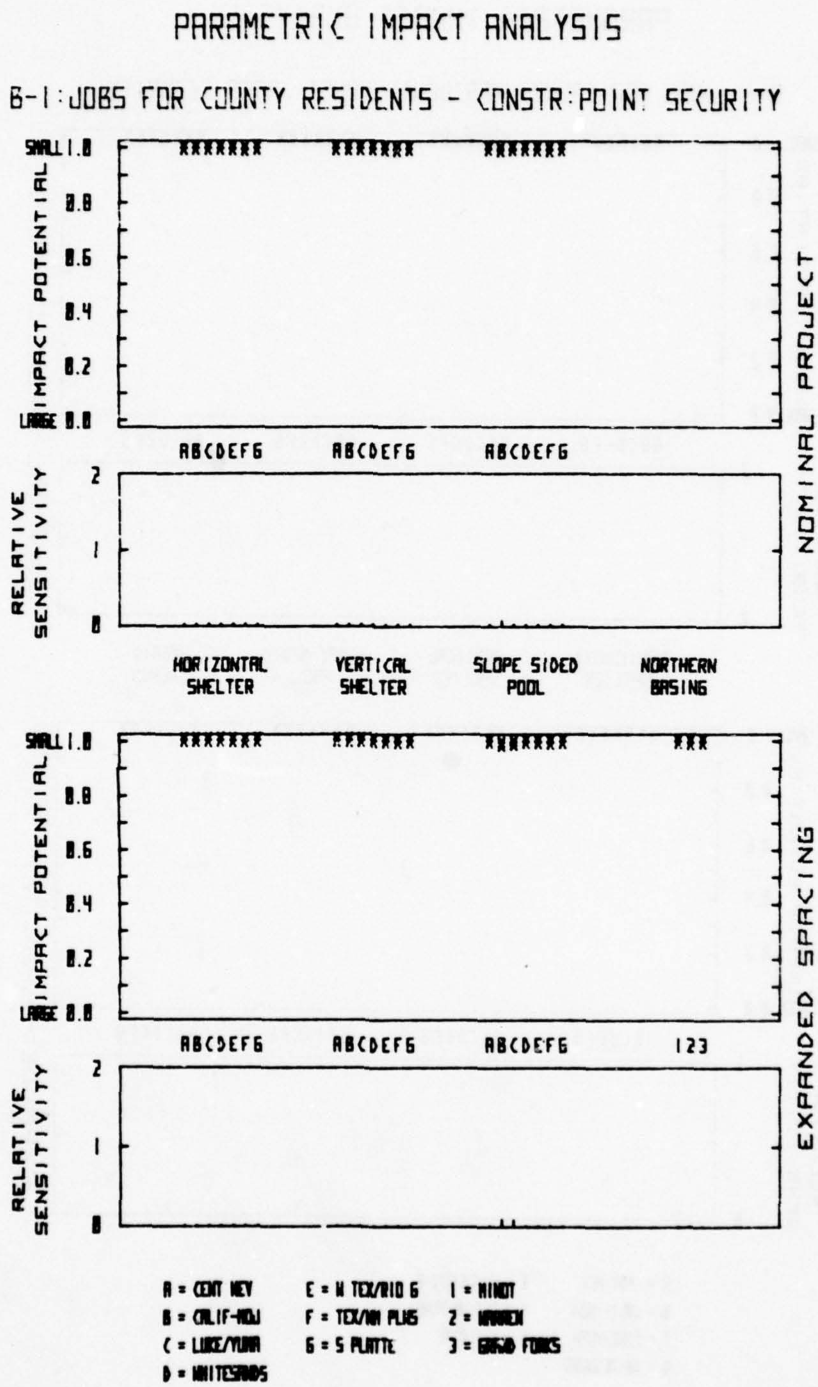

PARAMETRIC IMPACT ANALYSIS
B-1: JOBS FOR COUNTY RESIDENTS - CONSTR: POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG ABCDEFG ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
ABCDEFG ABCDEFG ABCDEFG 123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-28

PARAMETRIC IMPACT ANALYSIS

B-1 JOBS FOR COUNTY RESIDENTS-CONST: AREA SECURITY

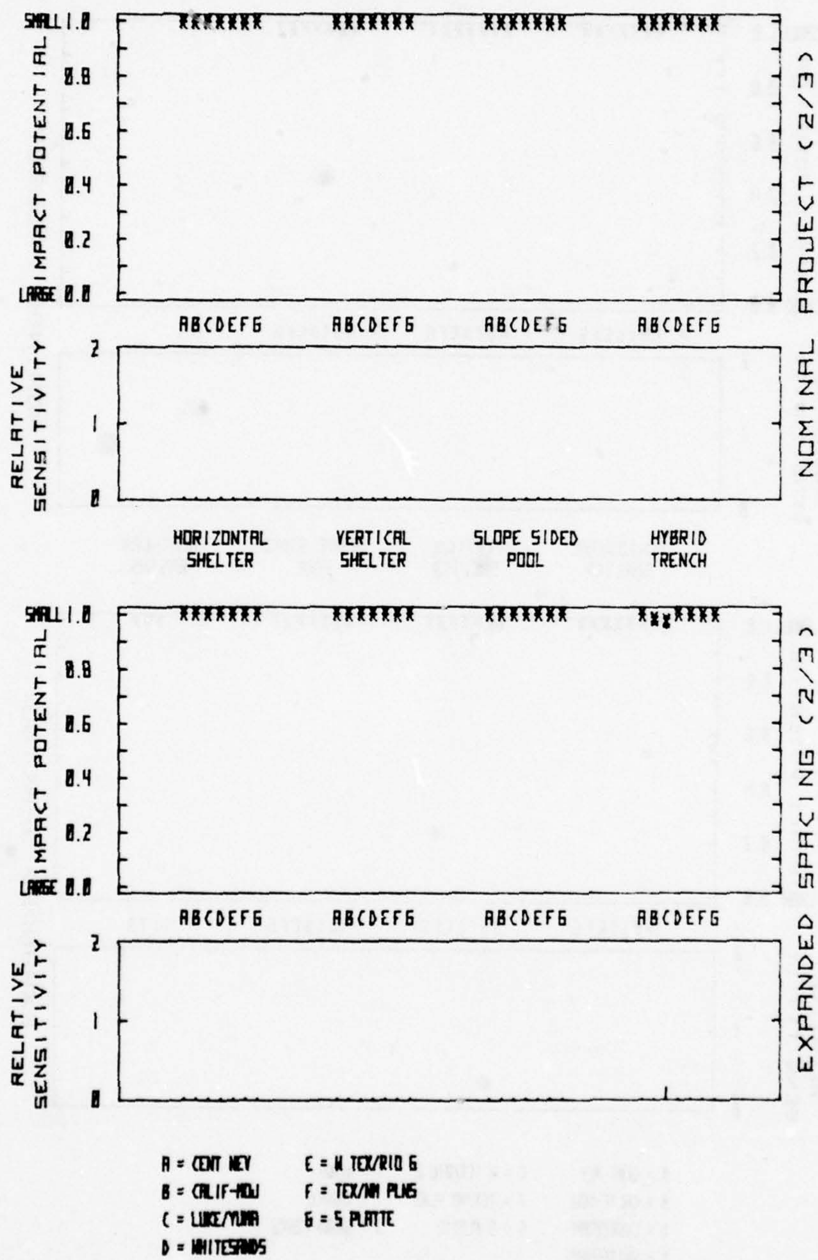


Figure B-29

PARAMETRIC IMPACT ANALYSIS

B-1 JOBS FOR COUNTY RESIDENTS: POINT SECURITY

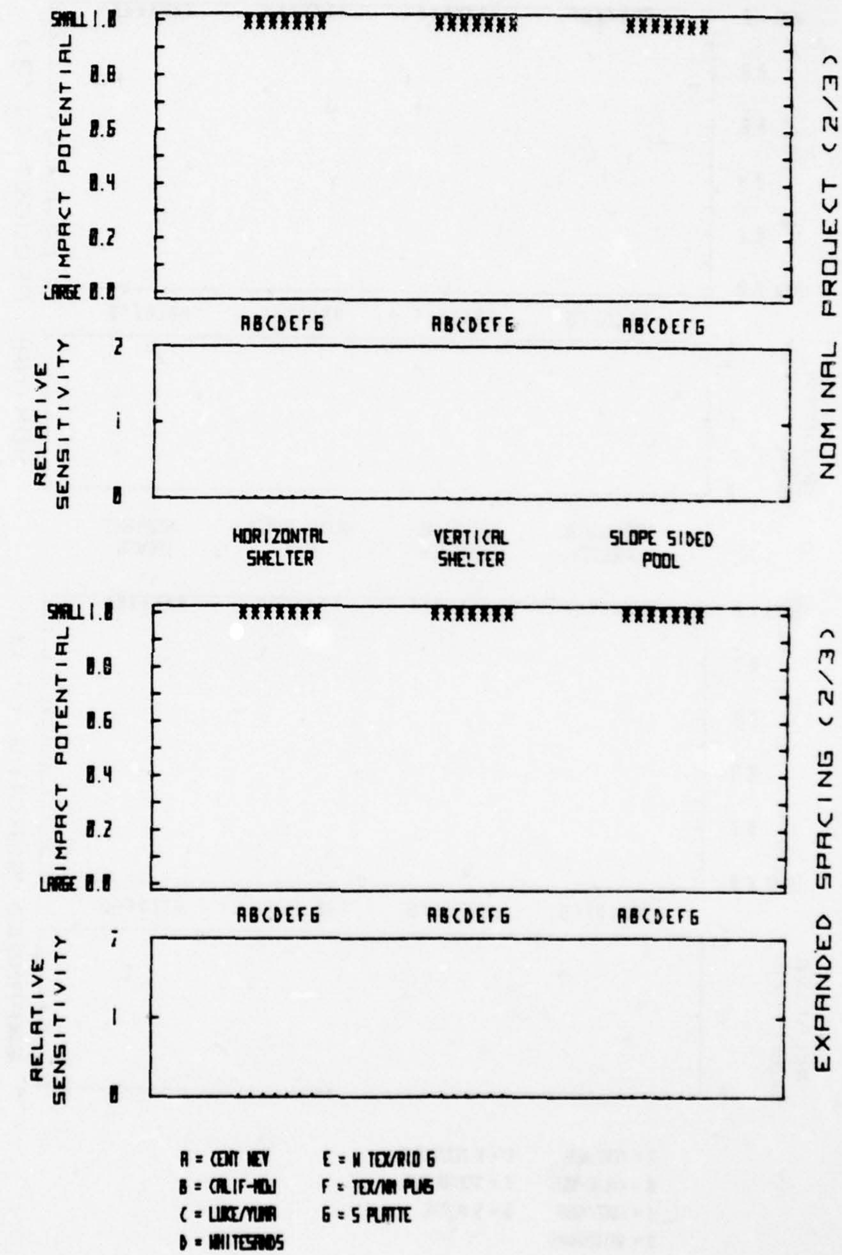


Figure B-30

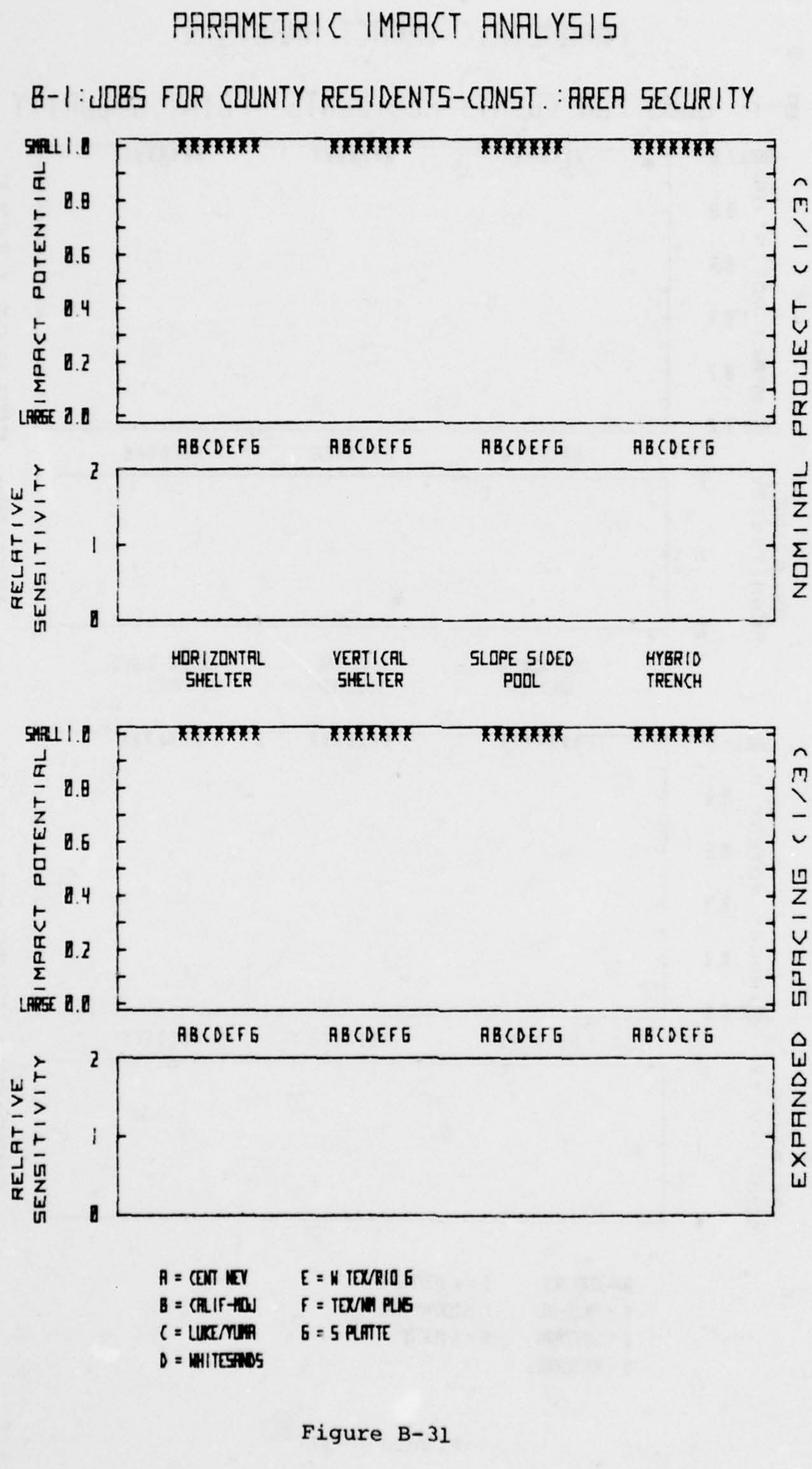

PARAMETRIC IMPACT ANALYSIS
B-1:JOBS FOR COUNTY RESIDENTS-CONST.:AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-31

PARAMETRIC IMPACT ANALYSIS

B-1 JOBS FOR COUNTY RESIDENTS-CONSTR: POINT SECURITY

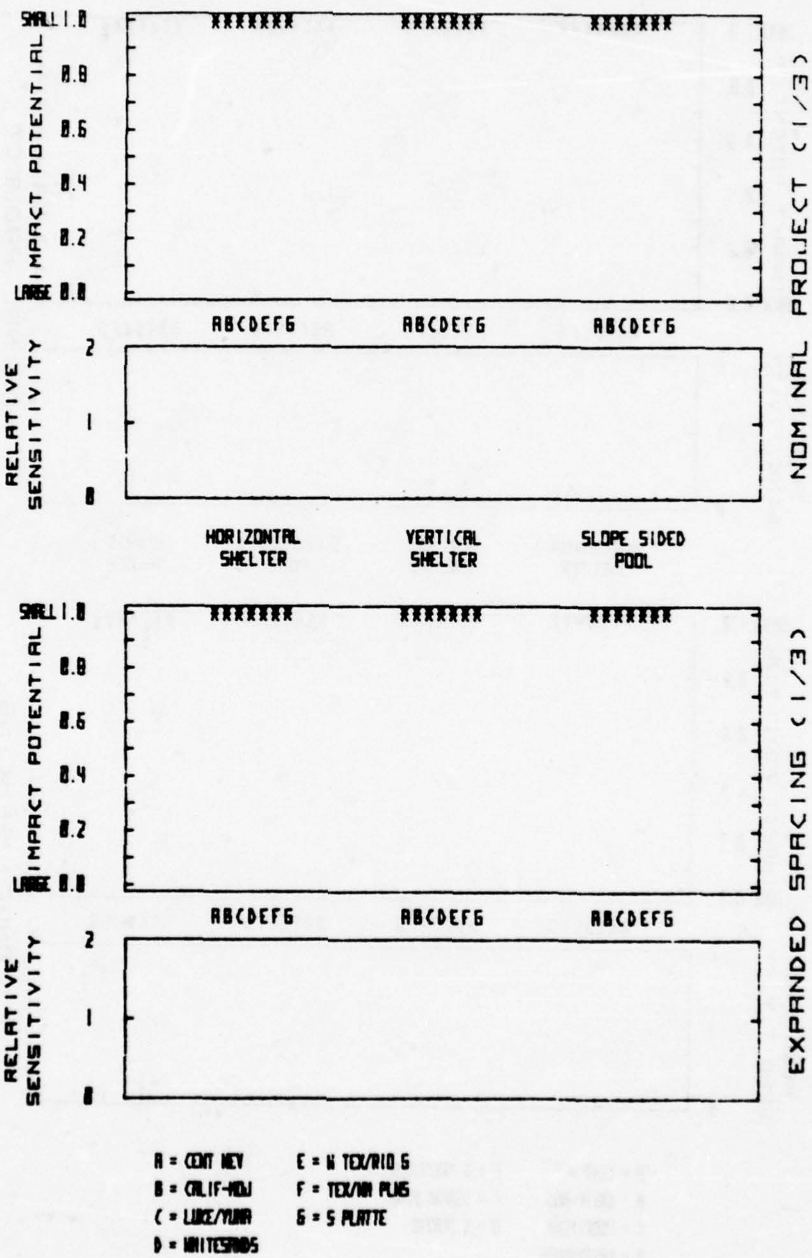


Figure B-32

PARAMETRIC IMPACT ANALYSIS

B-2: JOBS FOR COUNTY RESIDENTS EEP-CONST.: AREA SECURITY

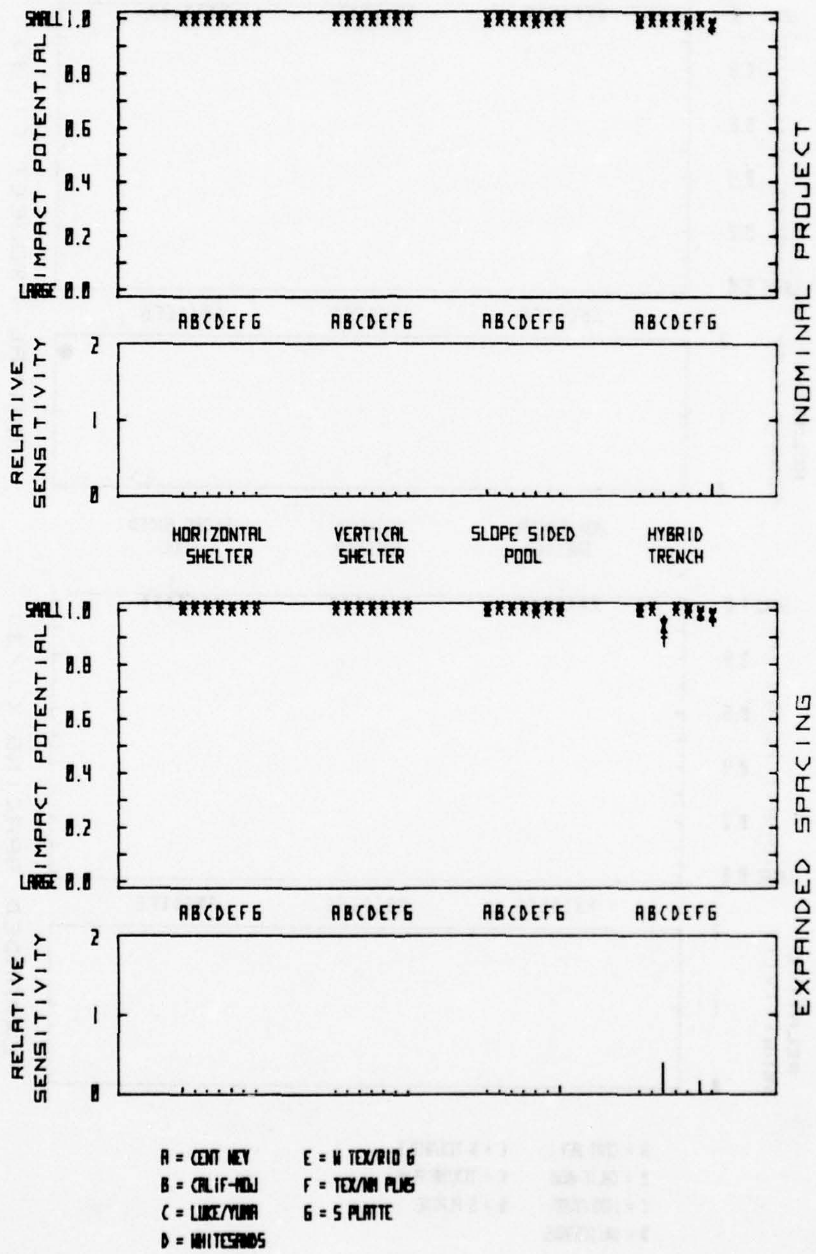


Figure B-33

PARAMETRIC IMPACT ANALYSIS

B-2:JOBS FOR COUNTY RESIDENTS EEP - CONSTR:POINT SECURITY

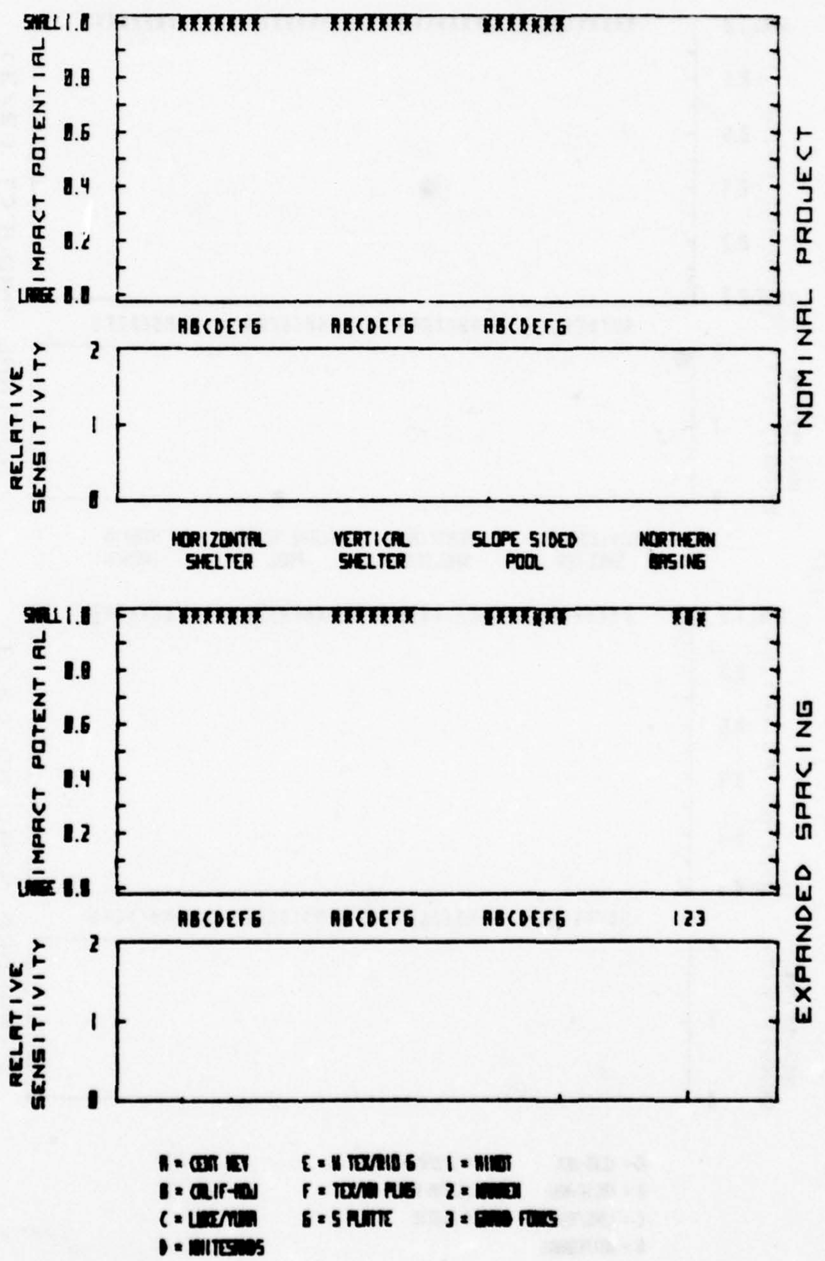


Figure B-34

PARAMETRIC IMPACT ANALYSIS

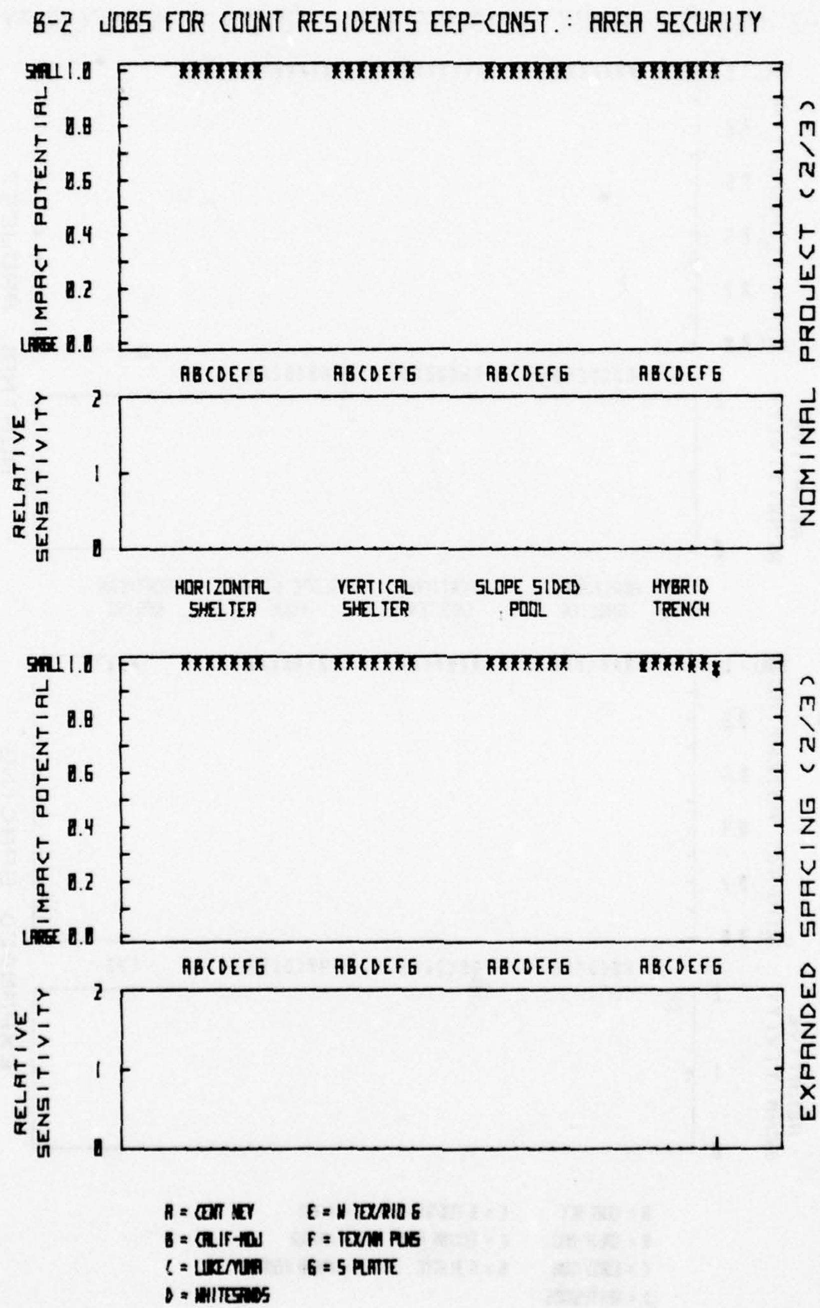
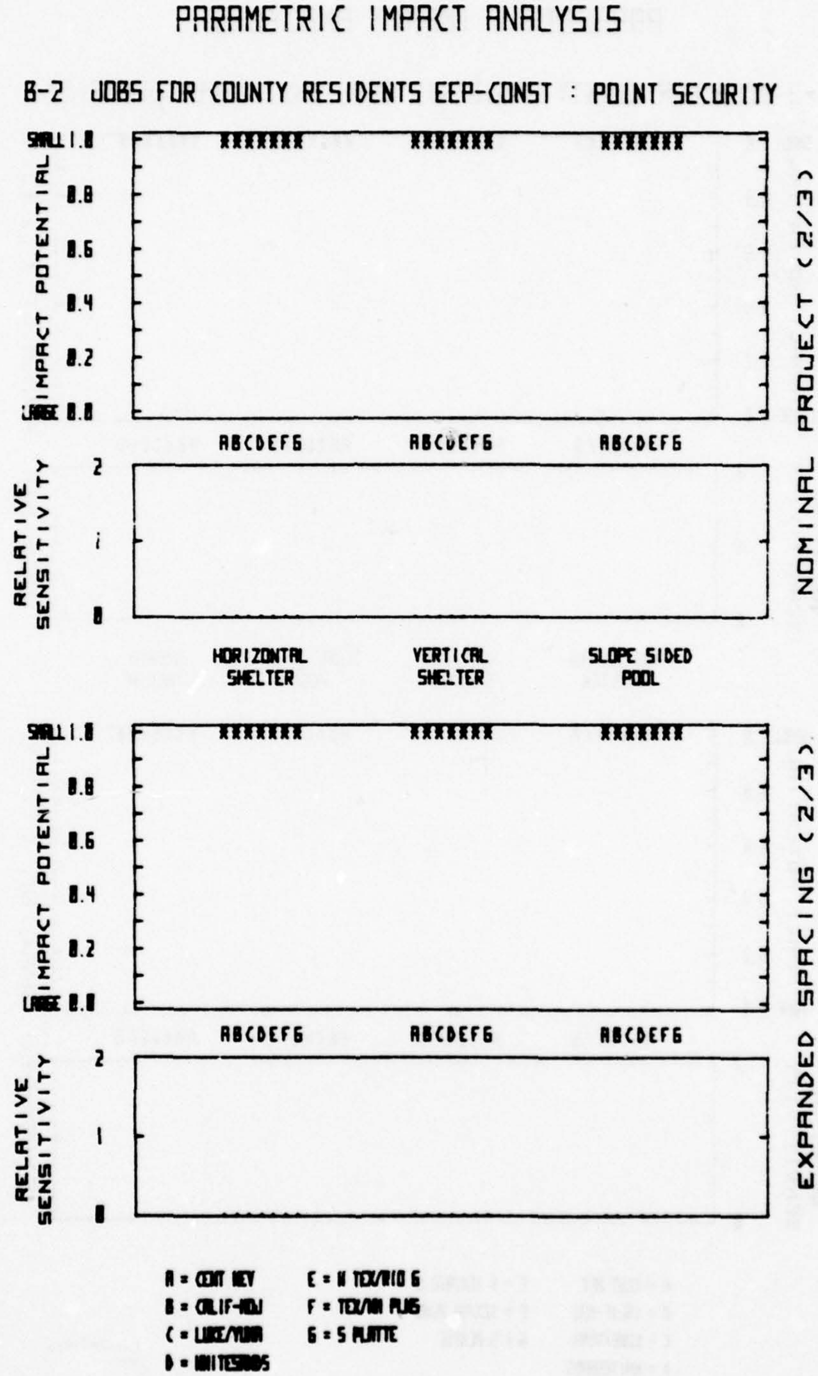


Figure B-35



PARAMETRIC IMPACT ANALYSIS
B-2 JOBS FOR COUNTY RESIDENTS EEP-CONST : POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-36

PARAMETRIC IMPACT ANALYSIS

B-2: JOBS FOR COUNTY RESIDENTS EEP-CONST.: AREA SECURITY

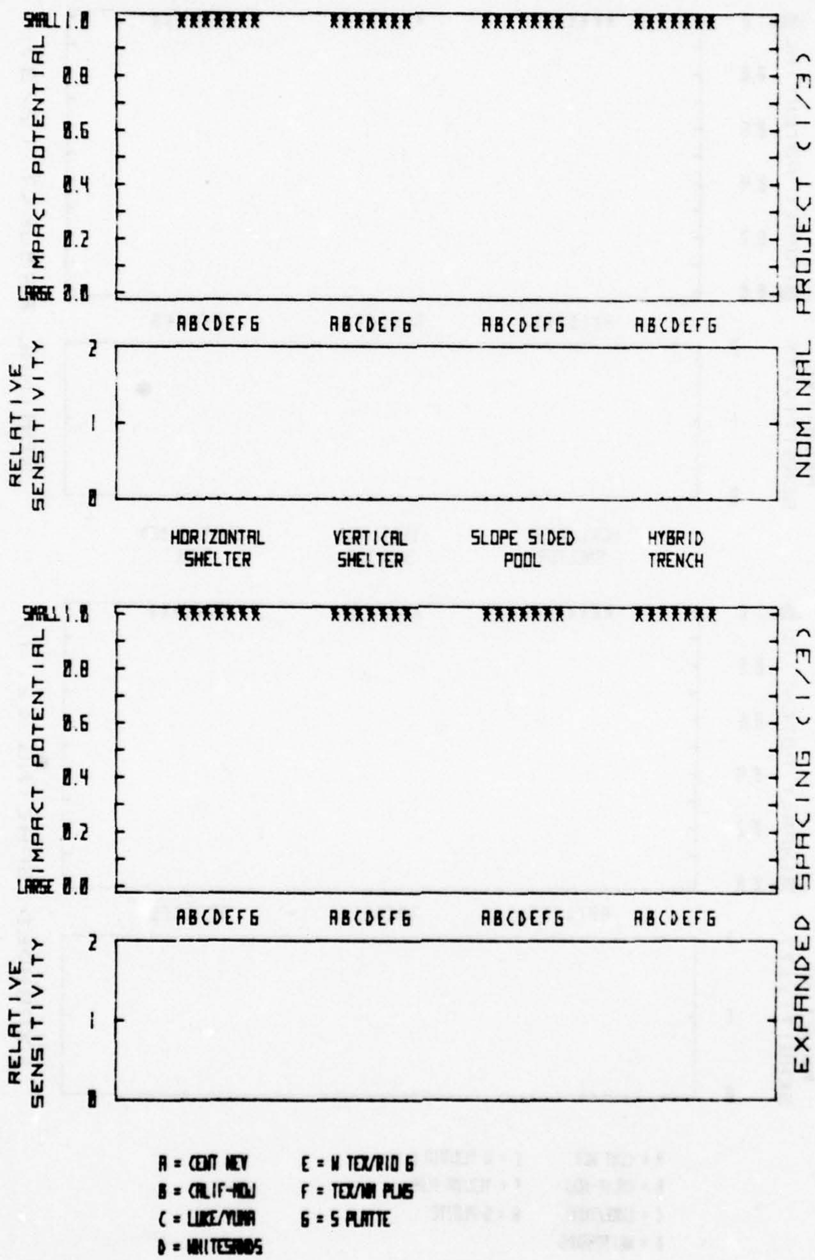


Figure B-37

PARAMETRIC IMPACT ANALYSIS

B-2 JOBS FOR COUNTY RESIDENTS EEP-CONSTR: POINT SECURITY

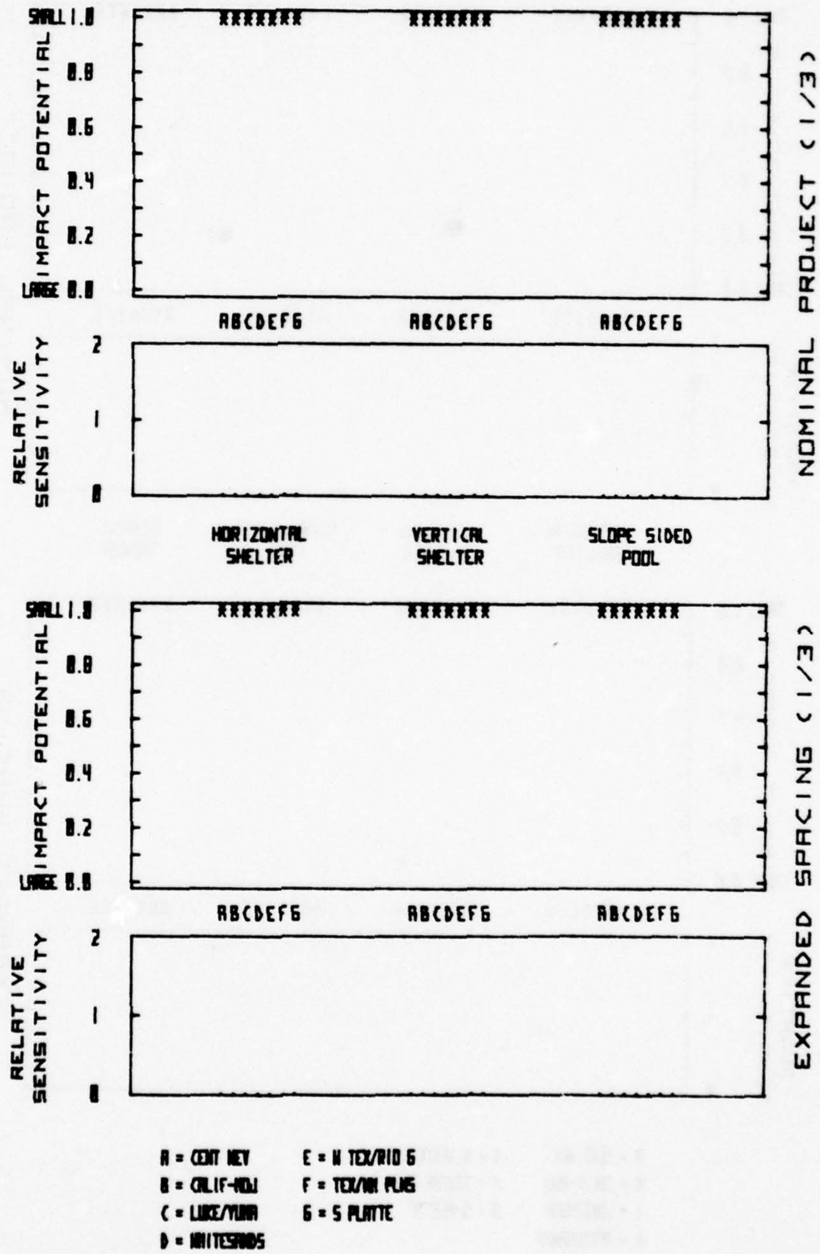


Figure B-38

PARAMETRIC IMPACT ANALYSIS

B-3: JOBS FOR COUNTY RESIDENTS-OPER.: AREA SECURITY

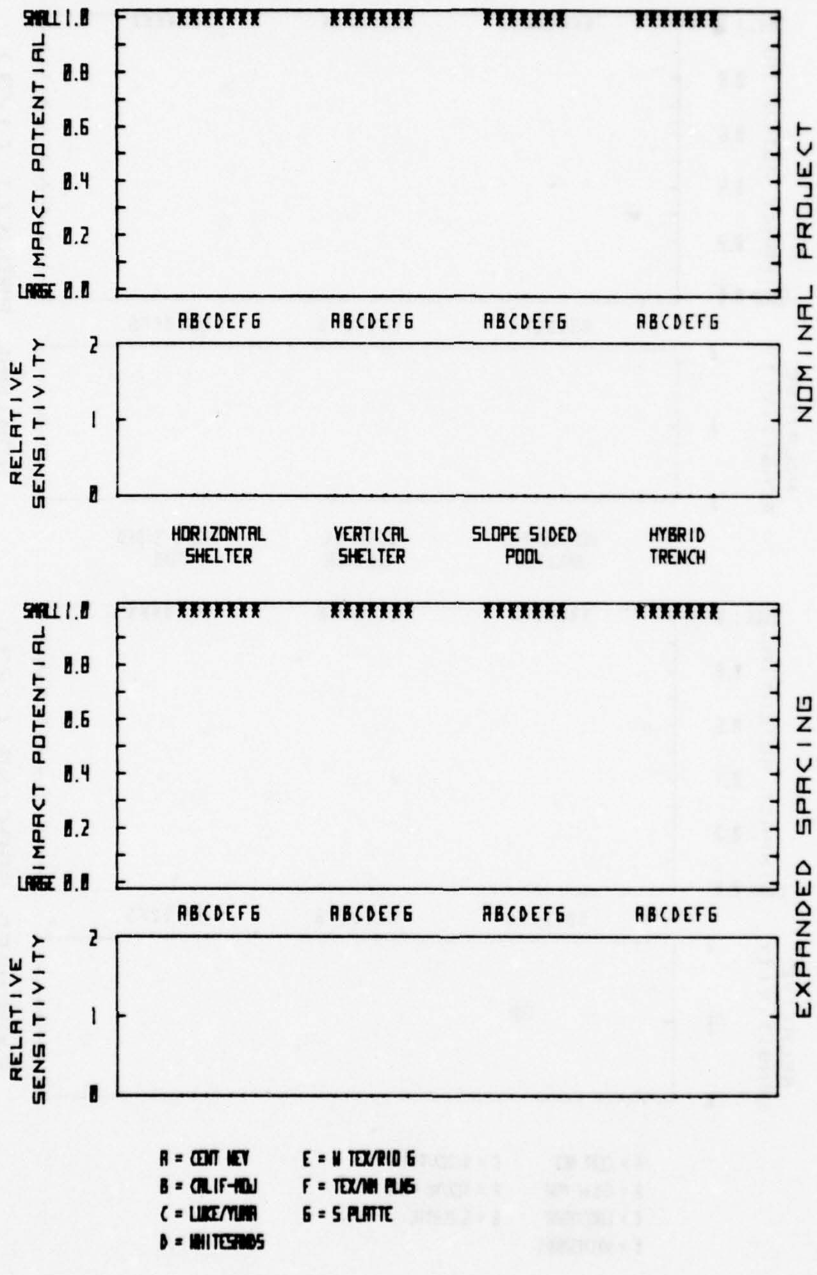


Figure B-39

PARAMETRIC IMPACT ANALYSIS

B-3:JOBS FOR COUNTY RESIDENTS - OPER:POINT SECURITY

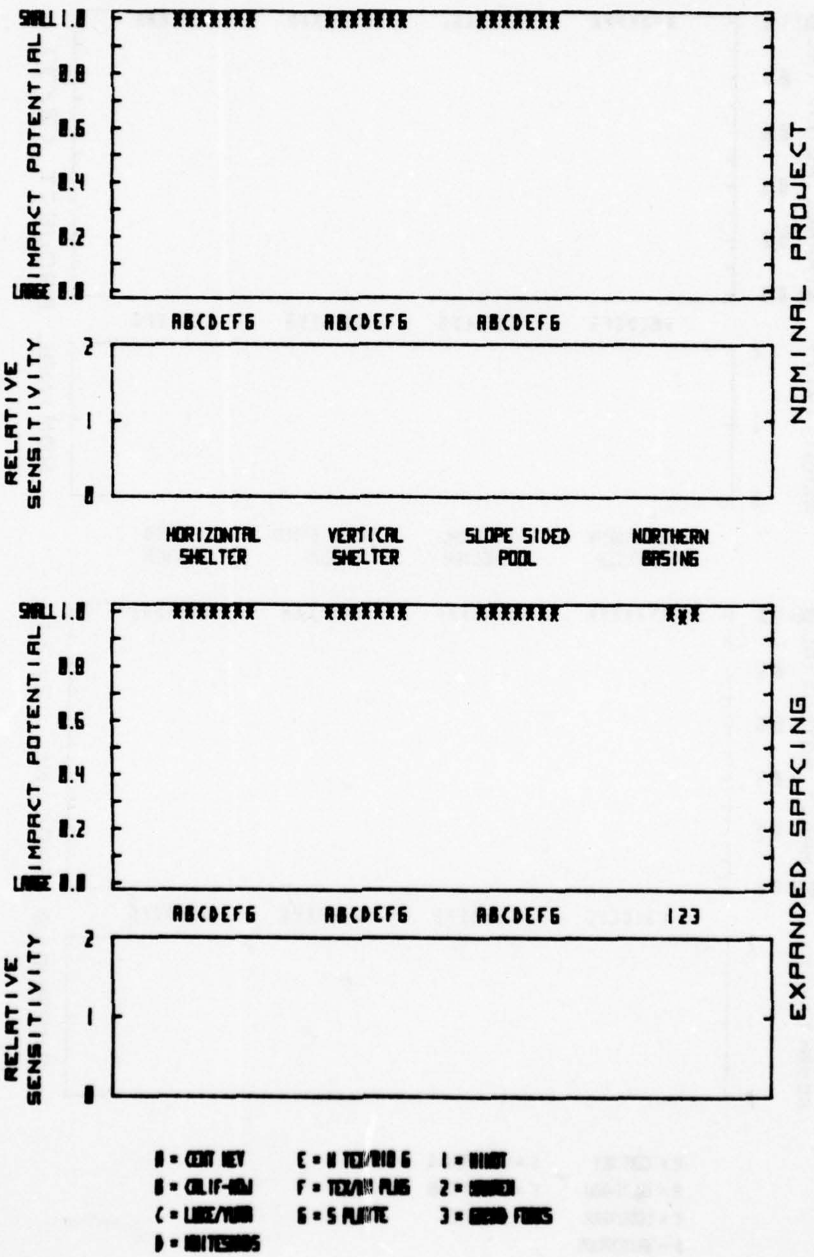


Figure B-40

PARAMETRIC IMPACT ANALYSIS

B-3 JOBS FOR COUNTY RESIDENTS-OPER.: AREA SECURITY

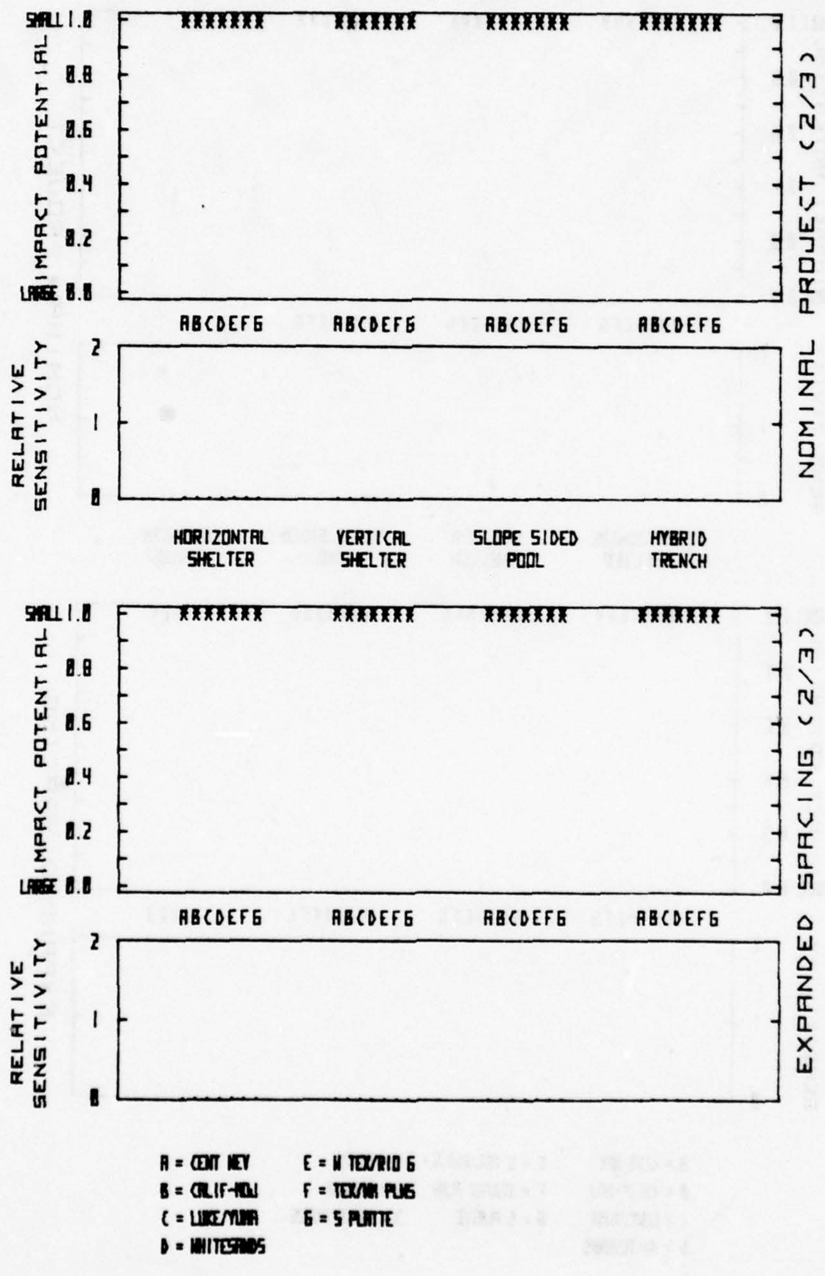


Figure B-41

PARAMETRIC IMPACT ANALYSIS

B-3 JOBS FOR COUNTY RESIDENTS-OPER.: POINT SECURITY

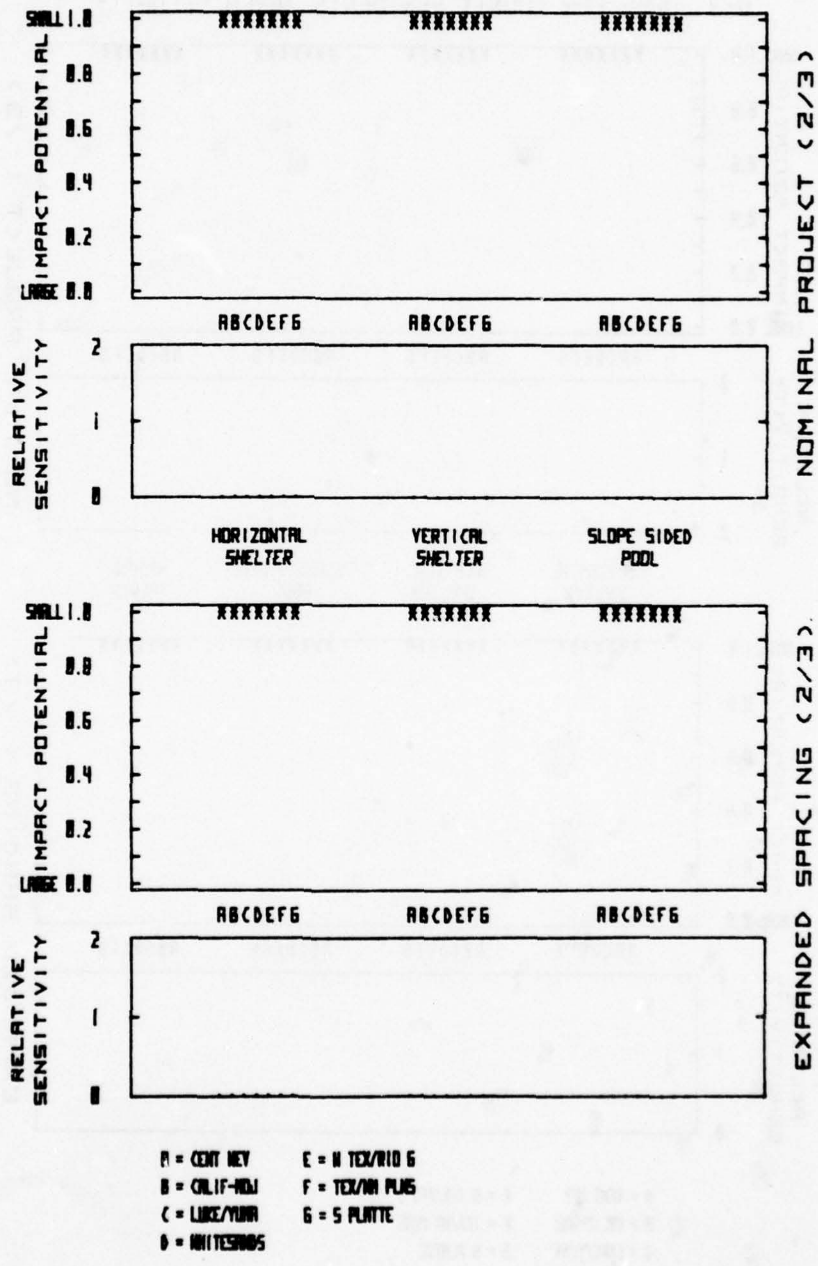


Figure B-42

PARAMETRIC IMPACT ANALYSIS

B-3: JOBS FOR COUNTY RESIDENTS :AREA SECURITY

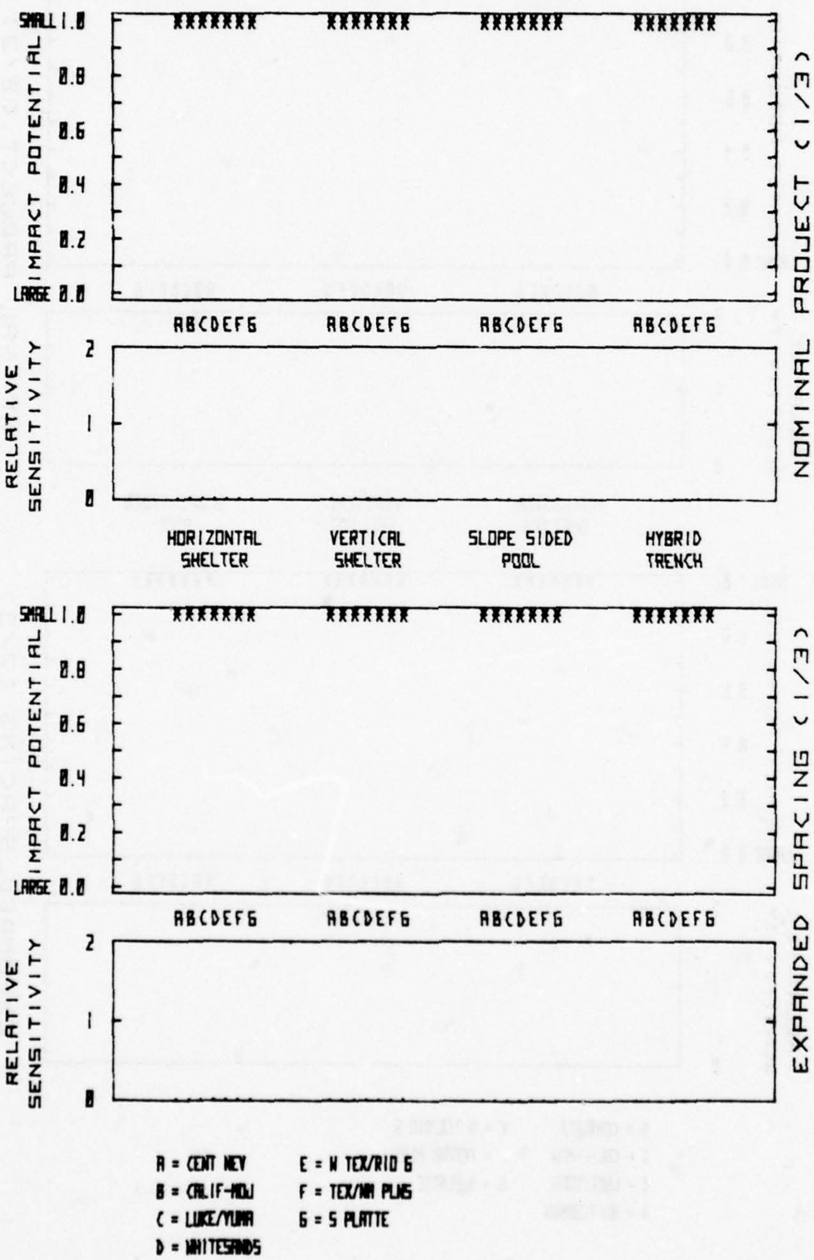


Figure B-43

PARAMETRIC IMPACT ANALYSIS

B-3 JOBS FOR COUNTRY RESIDENTS-OPER: POINT SECURITY

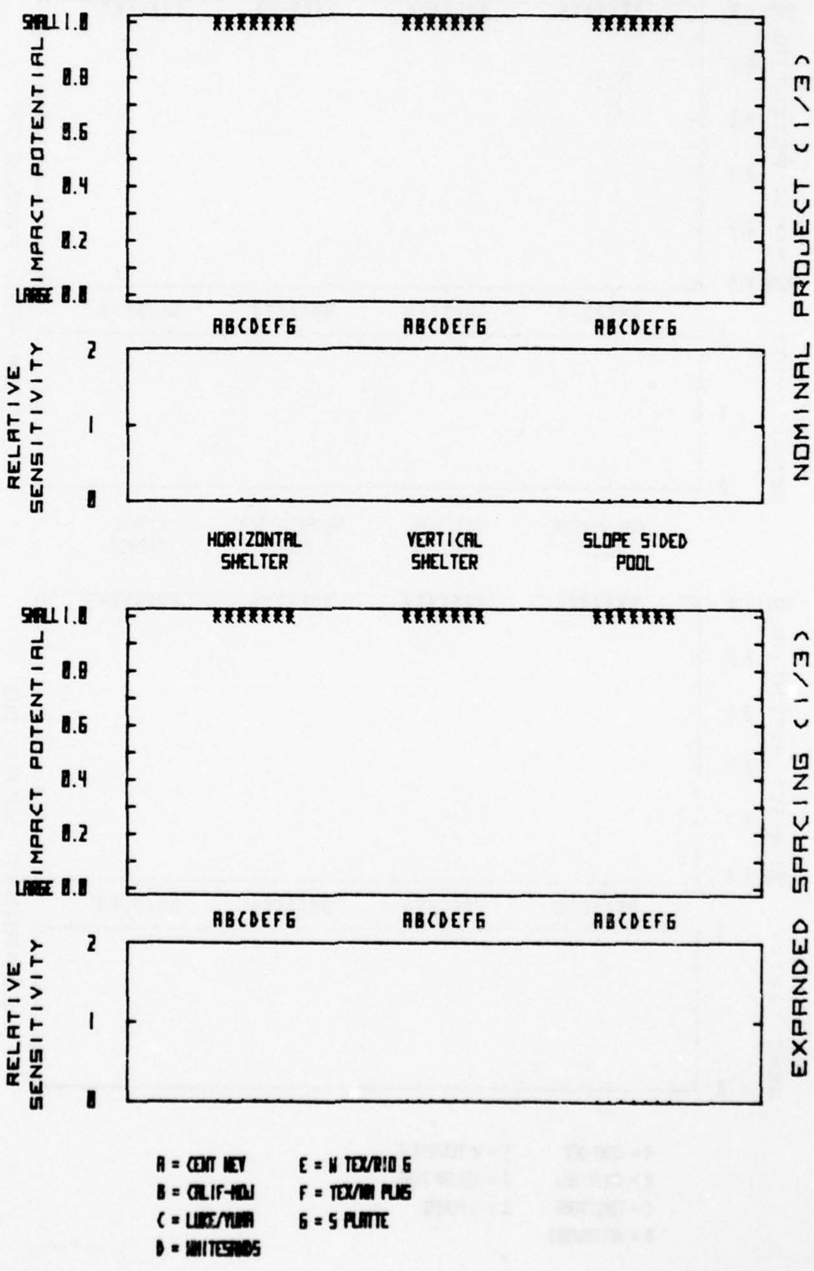


Figure B-44

PARAMETRIC IMPACT ANALYSIS

B-4: JOBS FOR COUNTY RESIDENTS EEP-OPER.: AREA SECURITY

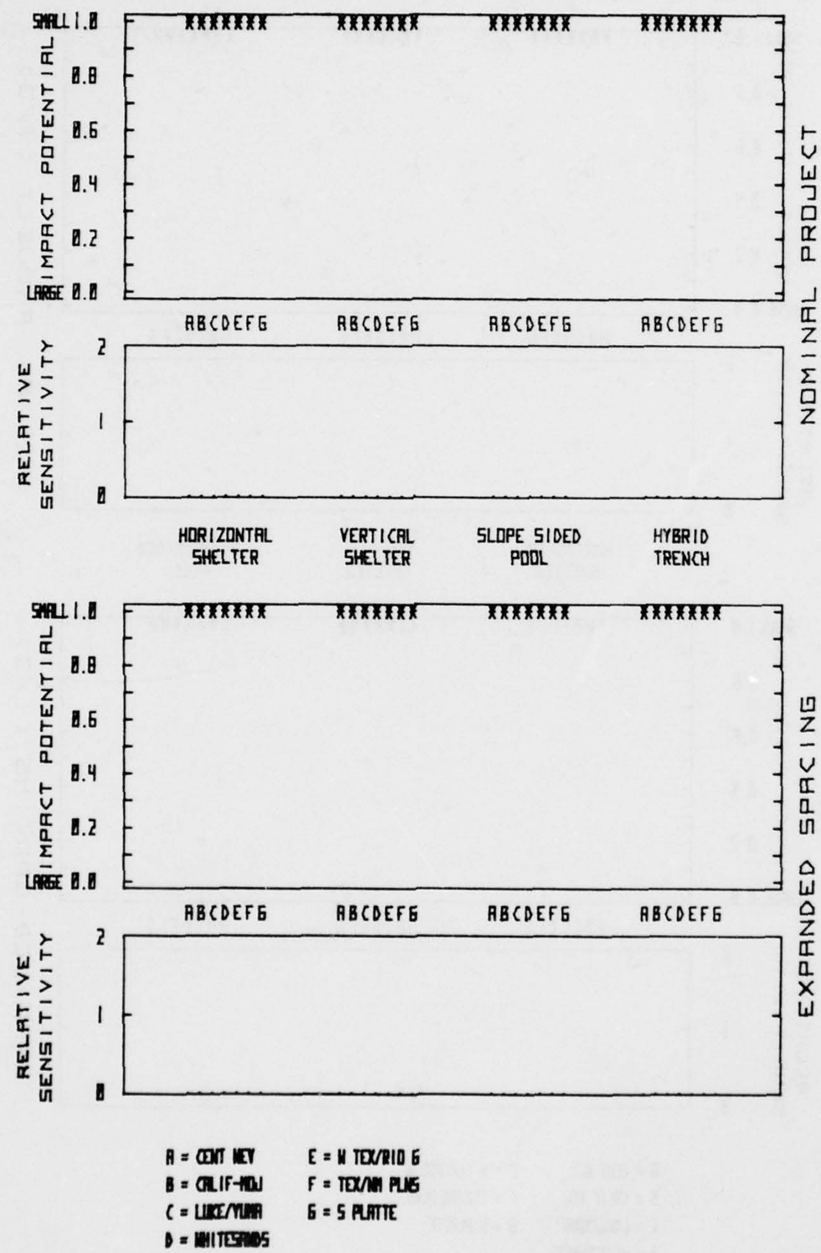


Figure B-45

PARAMETRIC IMPACT ANALYSIS

B-4: JOBS FOR COUNTY RESIDENTS EEP - OPER: POINT SECURITY

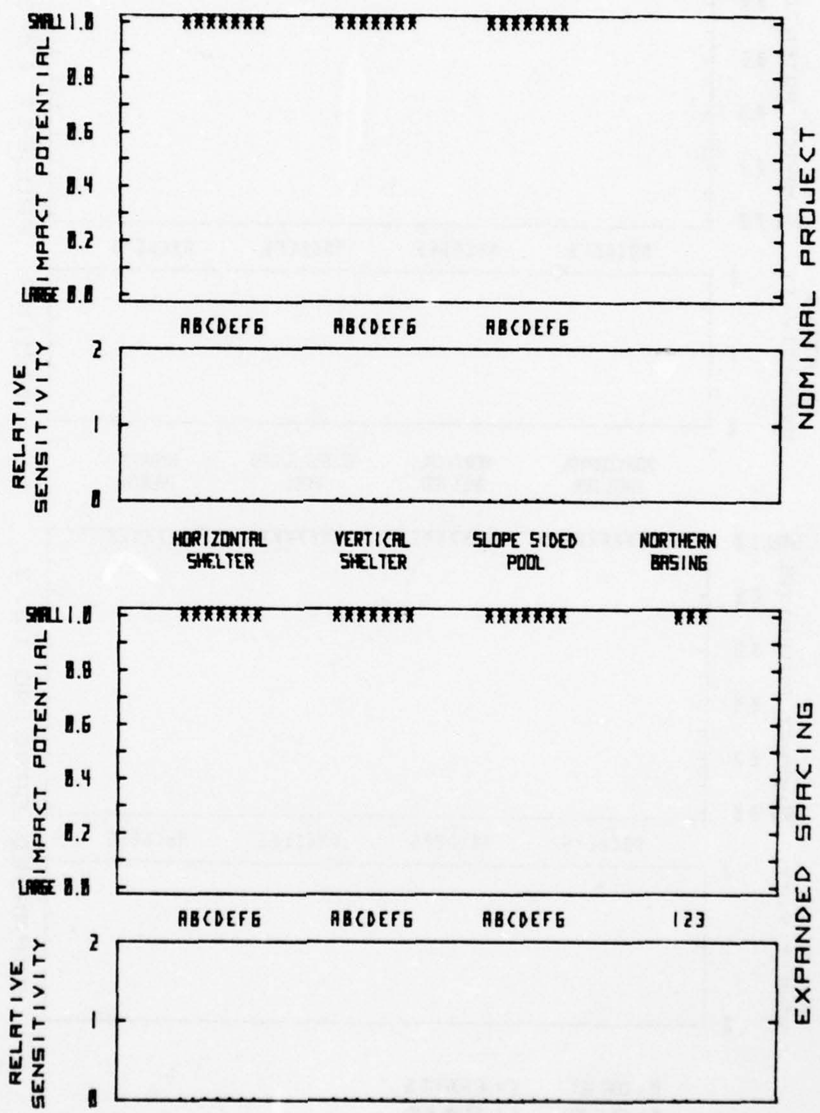
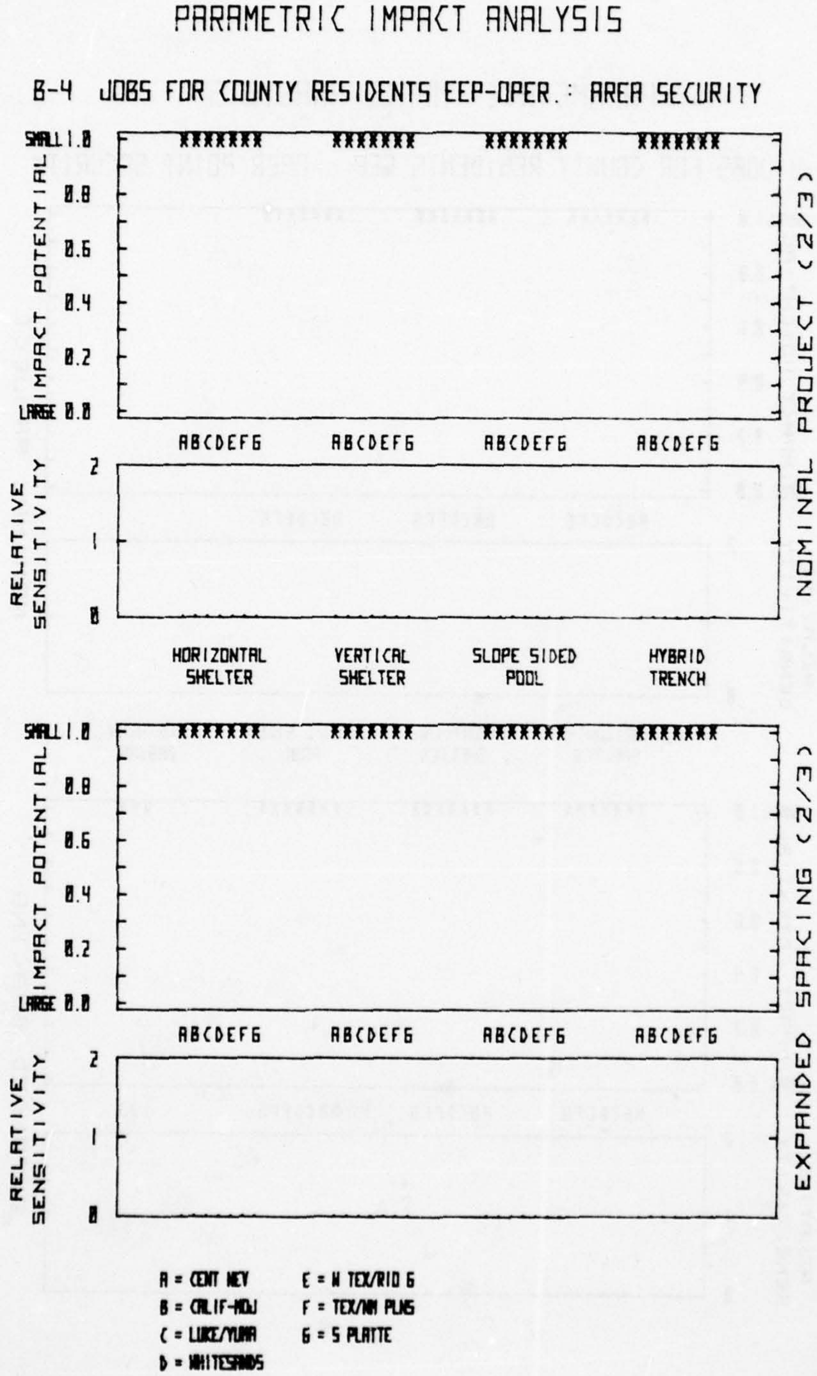


Figure B-46



PARAMETRIC IMPACT ANALYSIS
B-4 JOBS FOR COUNTY RESIDENTS EEP-OPER.: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG ABCDEFG ABCDEFG ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (2/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-47

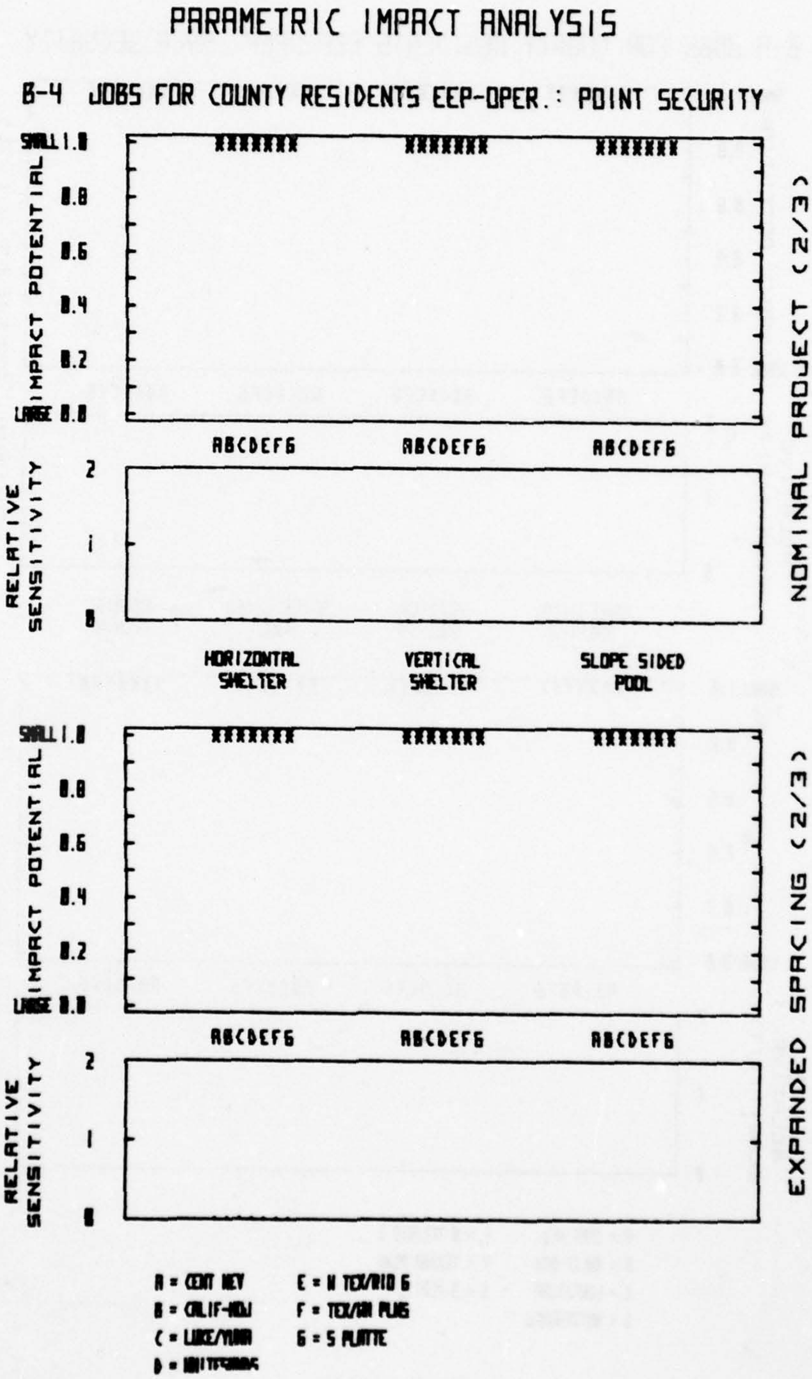

PARAMETRIC IMPACT ANALYSIS
B-4 JOBS FOR COUNTY RESIDENTS EEP-OPER.: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
E = N TEX/RIO G
F = TEX/OK PLNS
G = S PLATTE

Figure B-48

PARAMETRIC IMPACT ANALYSIS

B-4 JOBS FOR COUNTY RESIDENTS EEP-OPER: AREA SECURITY

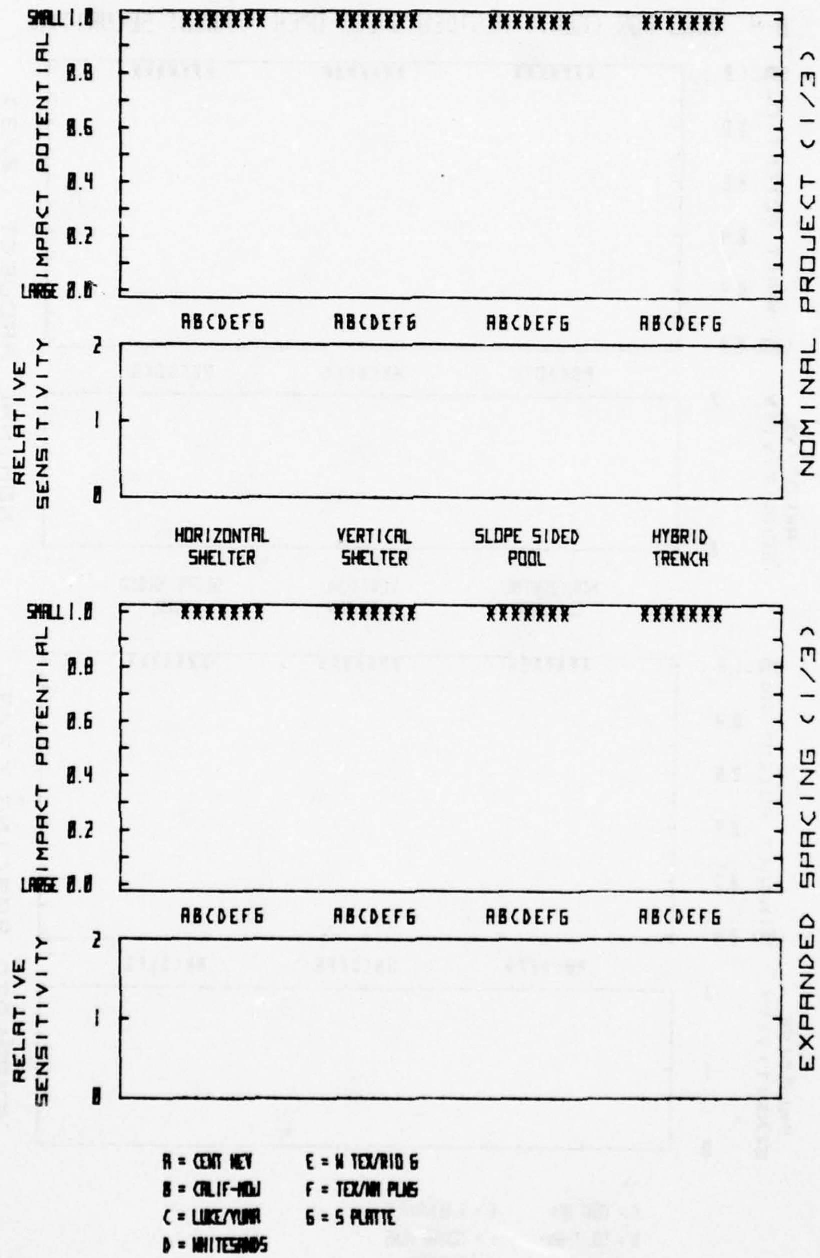


Figure B-49

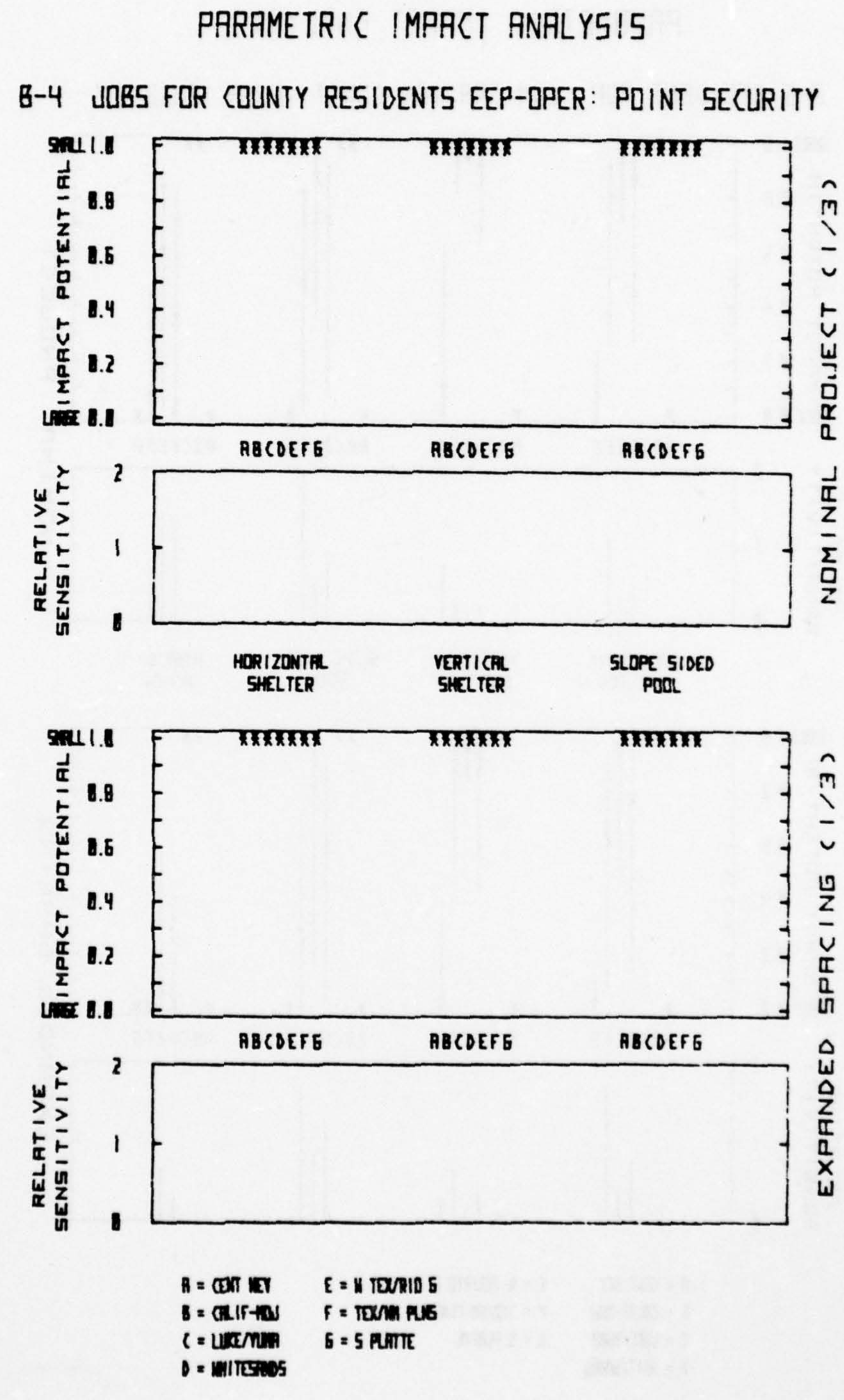

PARAMETRIC IMPACT ANALYSIS
B-4 JOBS FOR COUNTY RESIDENTS EEP-OPER: POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
2
1
0
RELATIVE SENSITIVITY
NOMINAL PROJECT (1/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-50

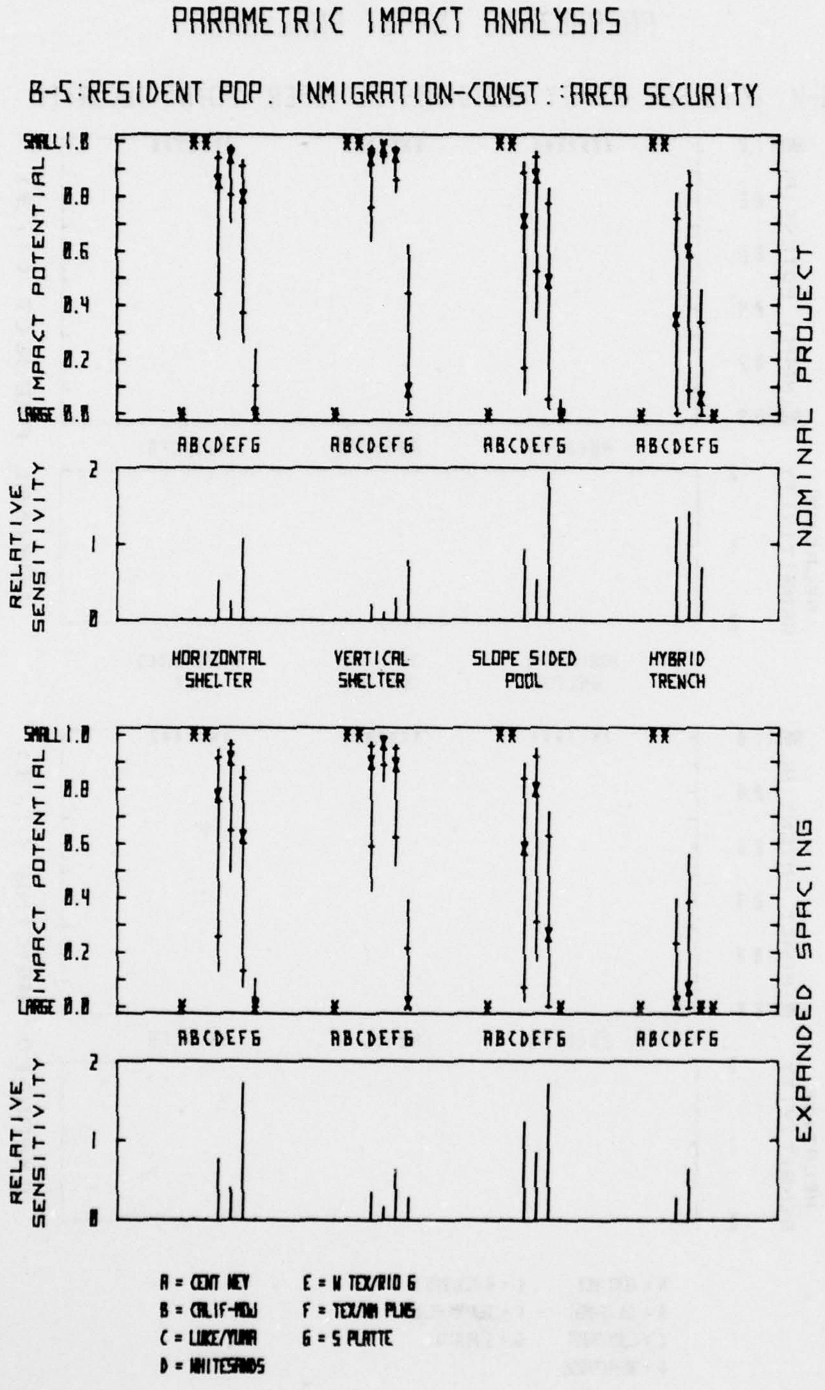
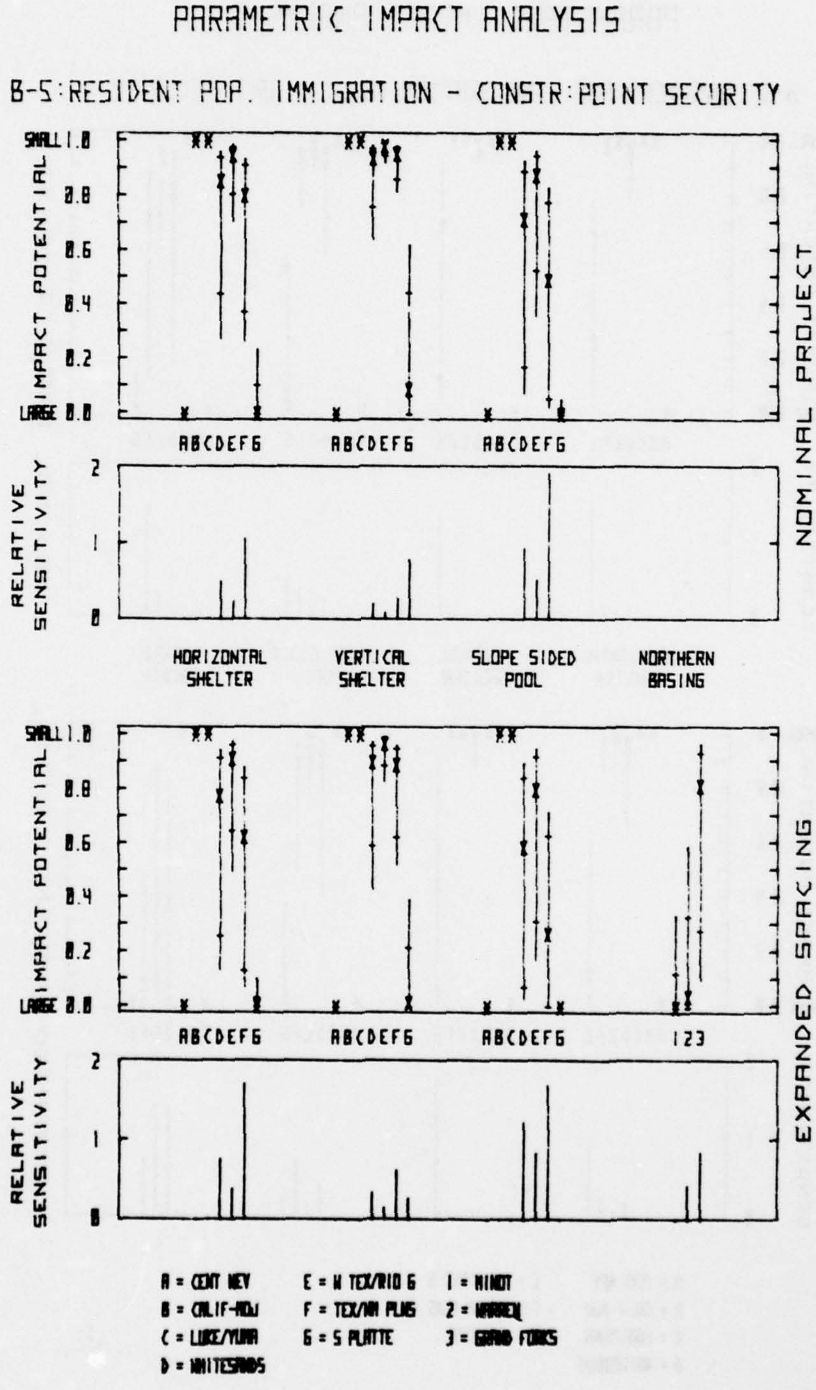

PARAMETRIC IMPACT ANALYSIS
B-5:RESIDENT POP. INMIGRATION-CONST.:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING
A = CENT NEV
B = CALIF-ARIZ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-51



PARAMETRIC IMPACT ANALYSIS
B-5:RESIDENT POP. IMMIGRATION - CONSTR:POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
123
RELATIVE SENSITIVITY
2
1
0
EXPANDED SPACING
A = CENT NEV
B = CALIF-ARIZ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-52

PARAMETRIC IMPACT ANALYSIS

B-5 RESIDENT POP. INMIGRATION-CONST.: AREA SECURITY

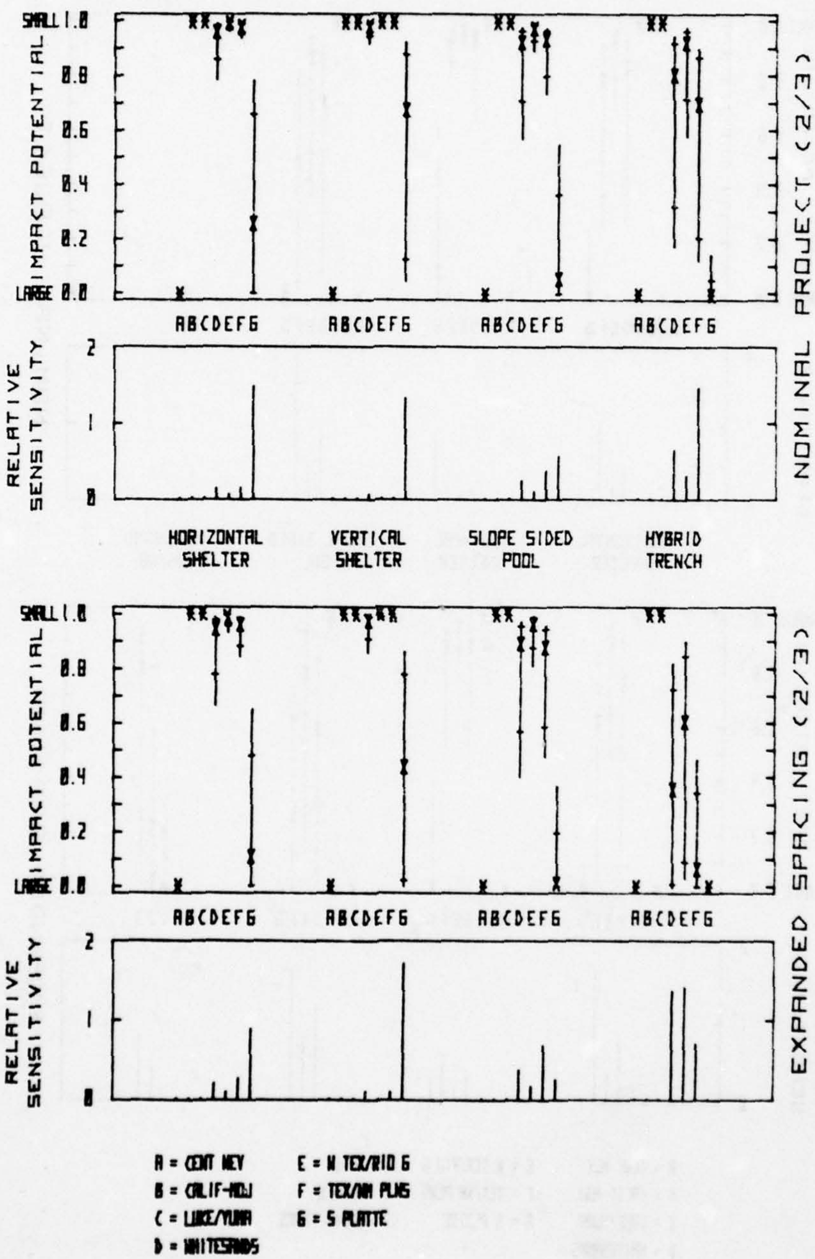


Figure B-53

PARAMETRIC IMPACT ANALYSIS

B-5 RESIDENT POP. INMIGRATION-CONST: POINT SECURITY

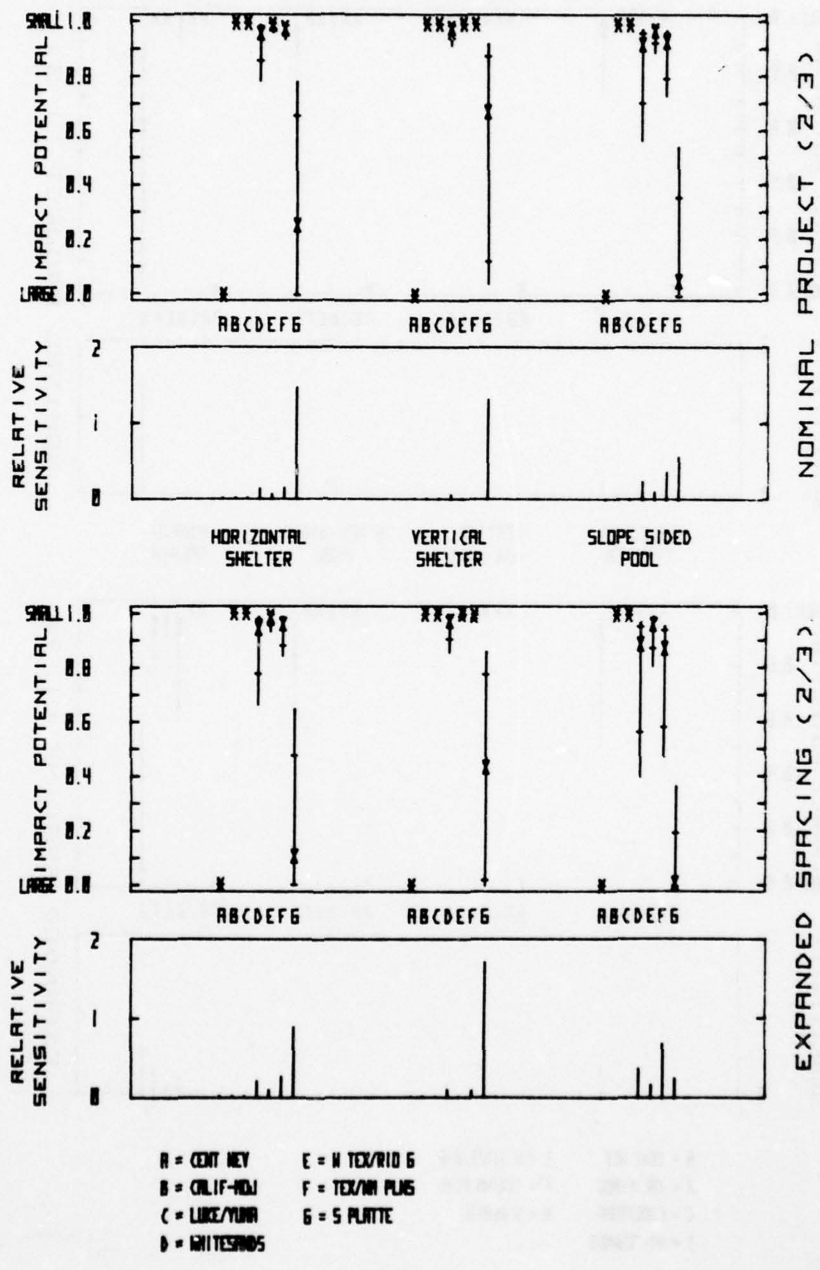


Figure B-54

PARAMETRIC IMPACT ANALYSIS

B-5 RESIDENT POP. INMIGRATION-CONSTR: AREA SECURITY

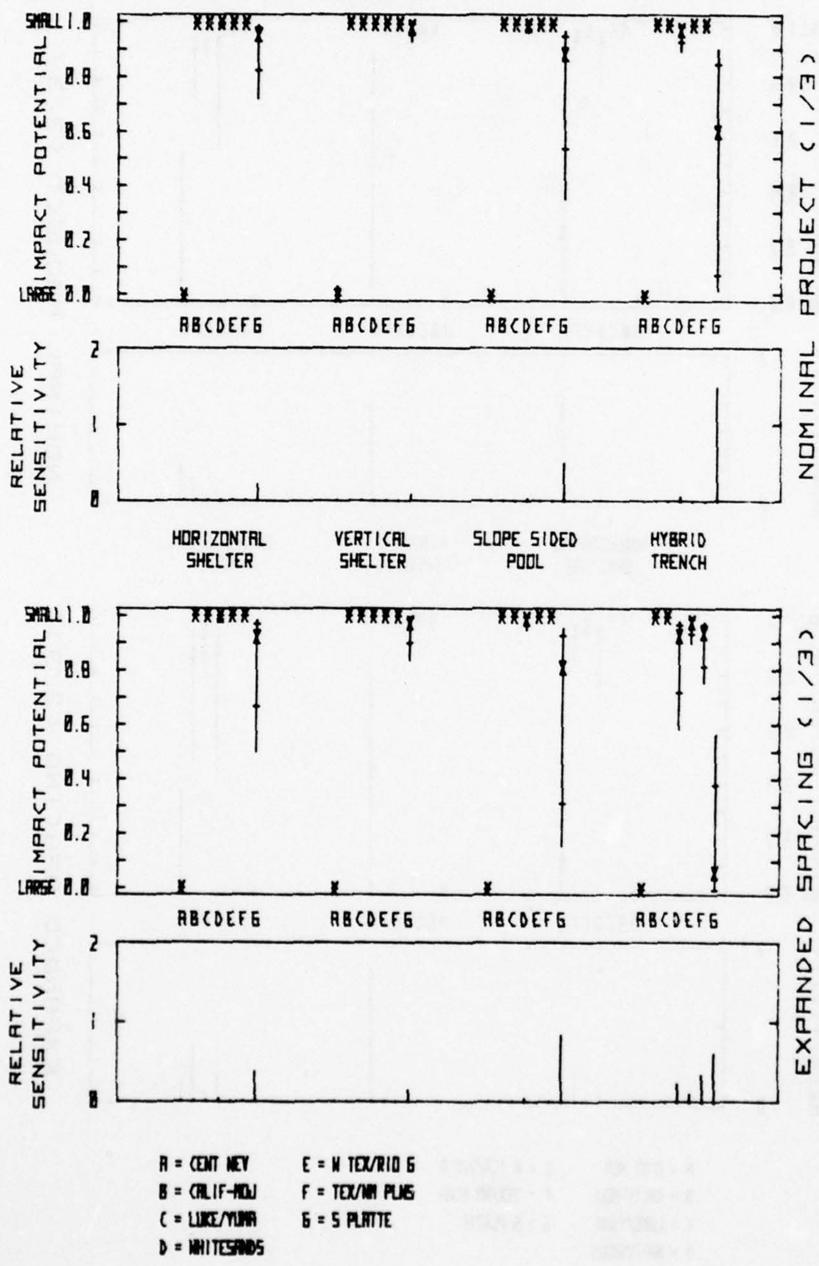


Figure B-55

PARAMETRIC IMPACT ANALYSIS

B-5 RESIDENT POP. INMIGRATION-CONSTR: POINT SECURITY

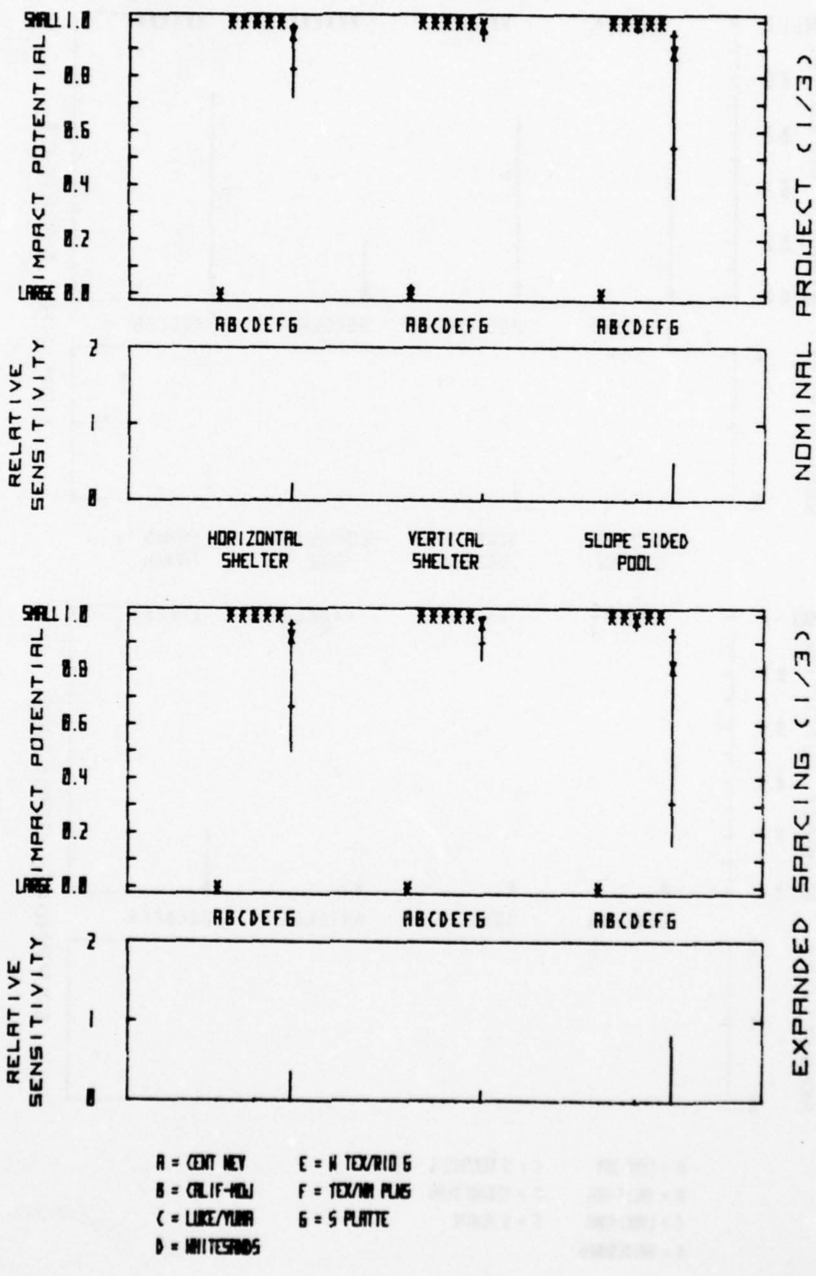


Figure B-56

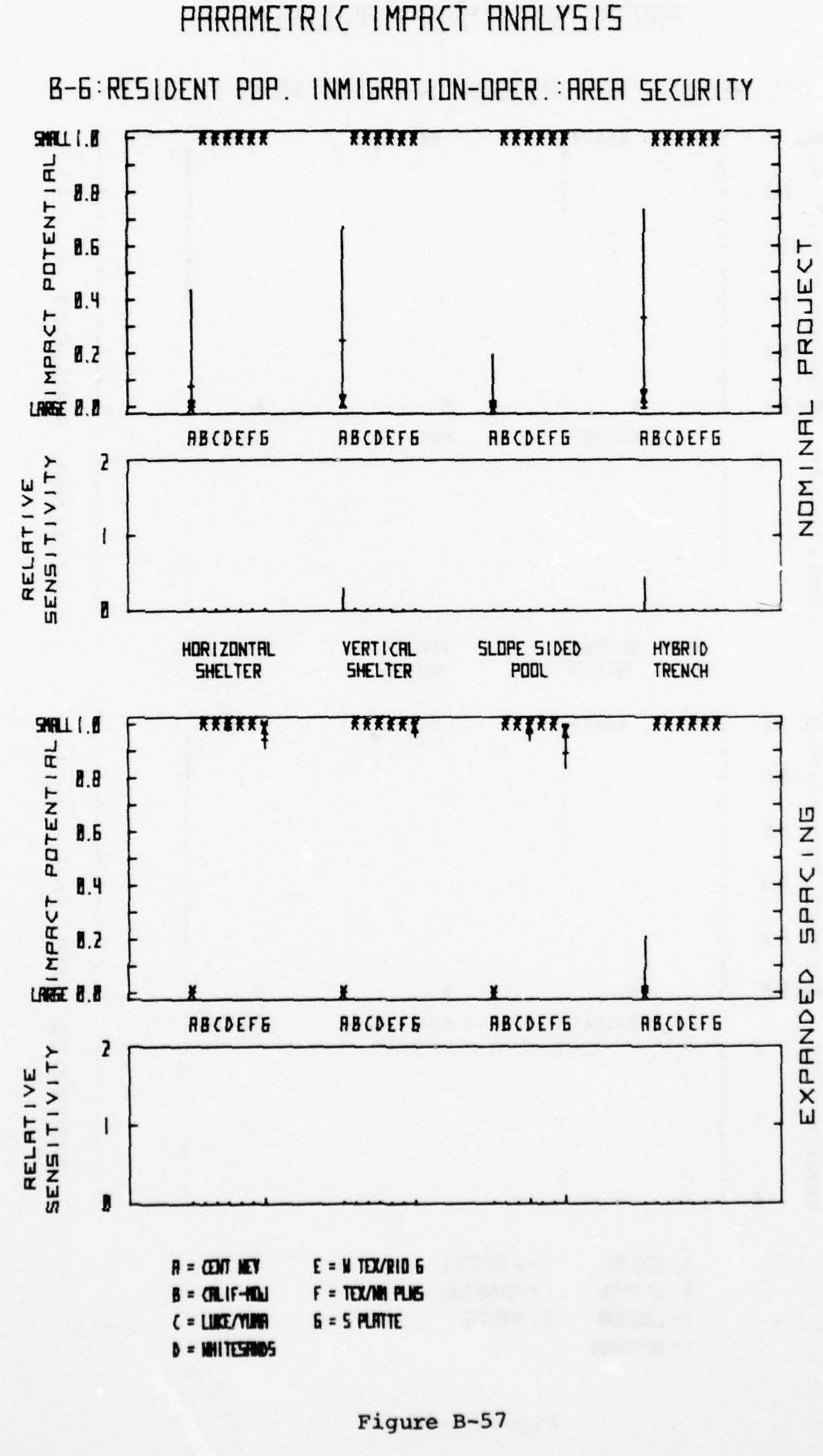

PARAMETRIC IMPACT ANALYSIS
B-6: RESIDENT POP. INMIGRATION-OPER.: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-57

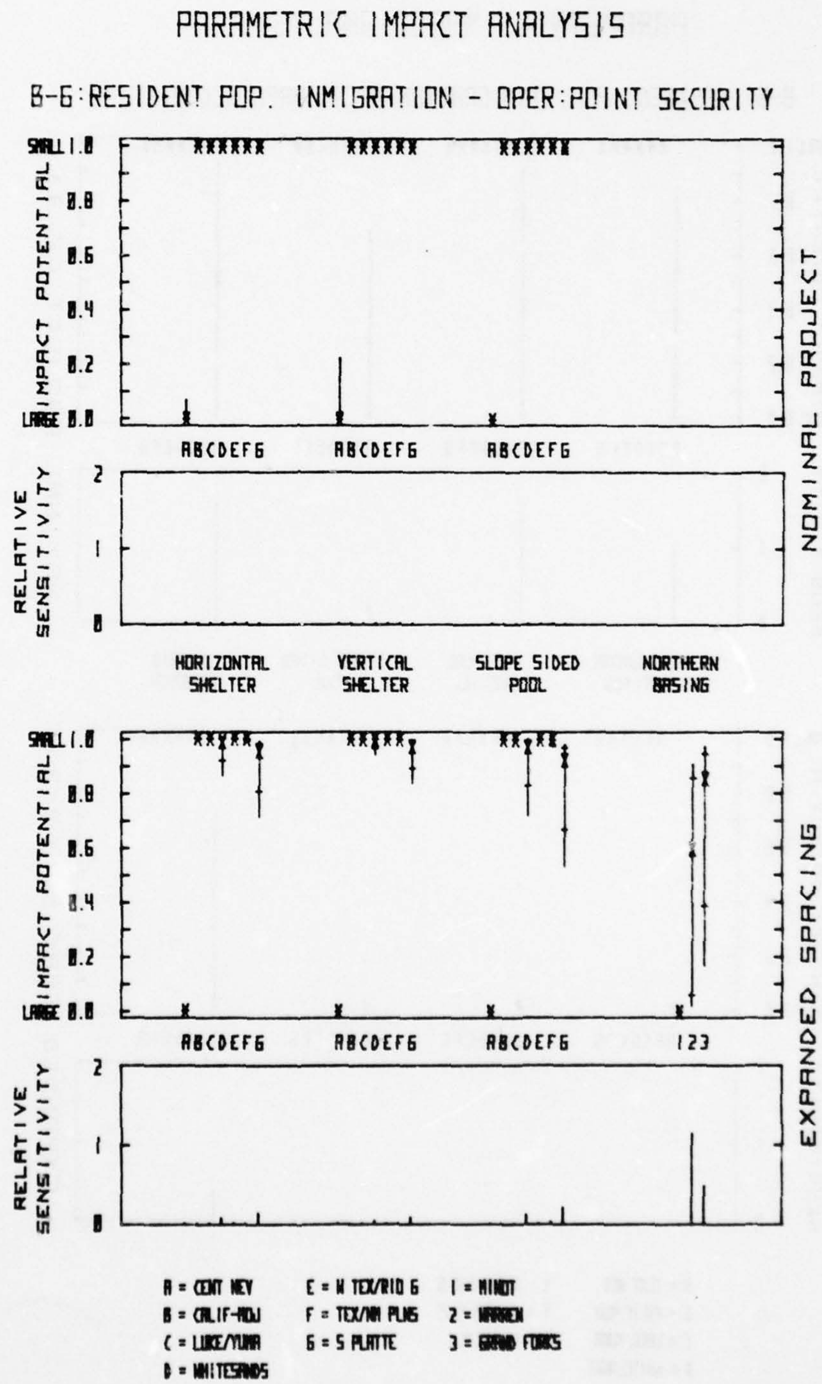

PARAMETRIC IMPACT ANALYSIS
B-6:RESIDENT POP. INMIGRATION - OPER:POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-ADJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-58

AD-A063 495   AIR FORCE SYSTEMS COMMAND WASHINGTON D C   F/G 5/5
MX: MILESTONE II. FINAL ENVIRONMENTAL IMPACT STATEMENT. VOLUME --ETC(U)
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UNCLASSIFIED   AFSC-TR-79-01-VOL-5   NL

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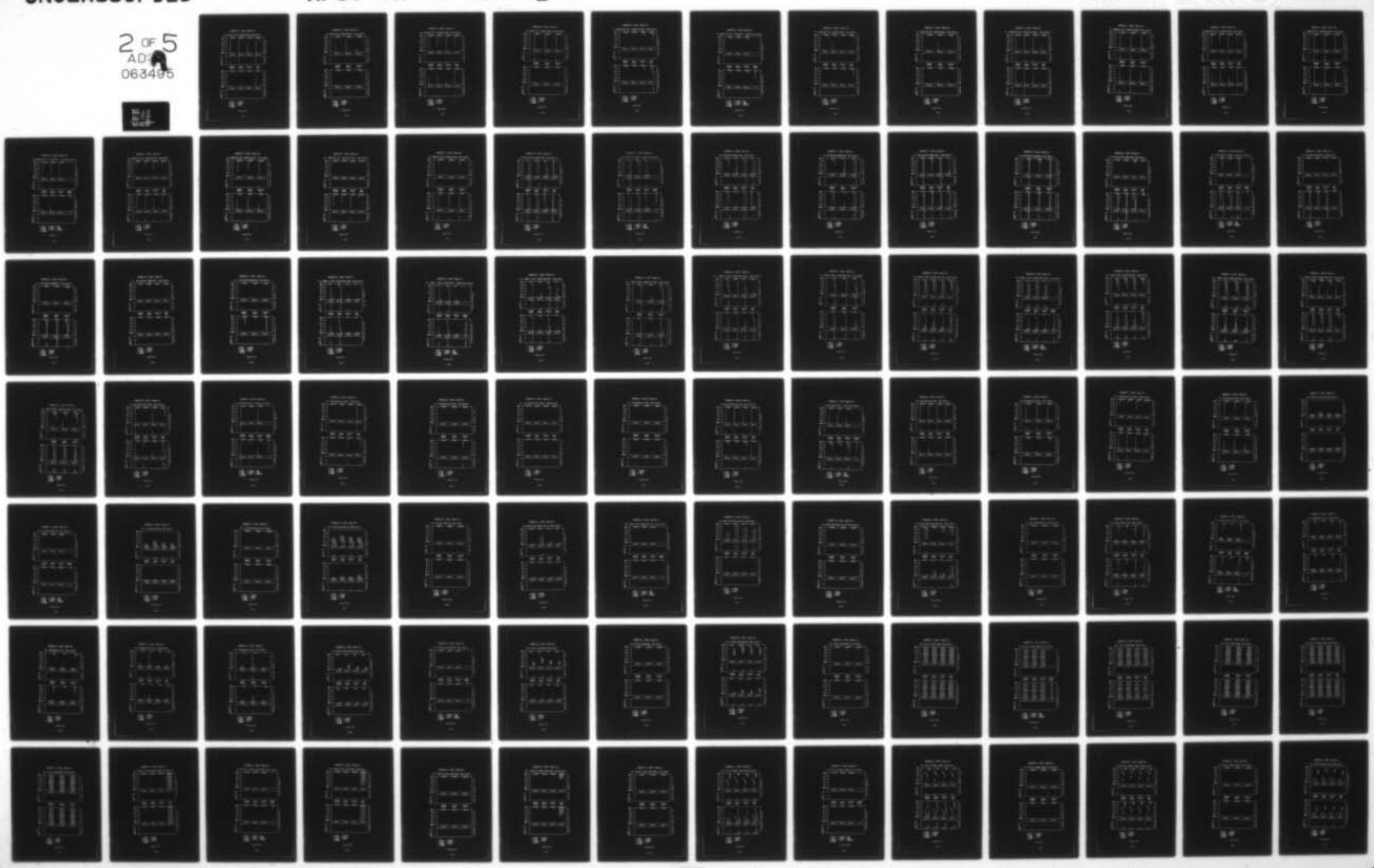
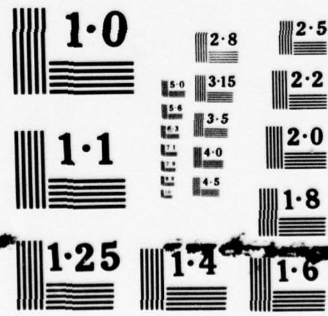


063495



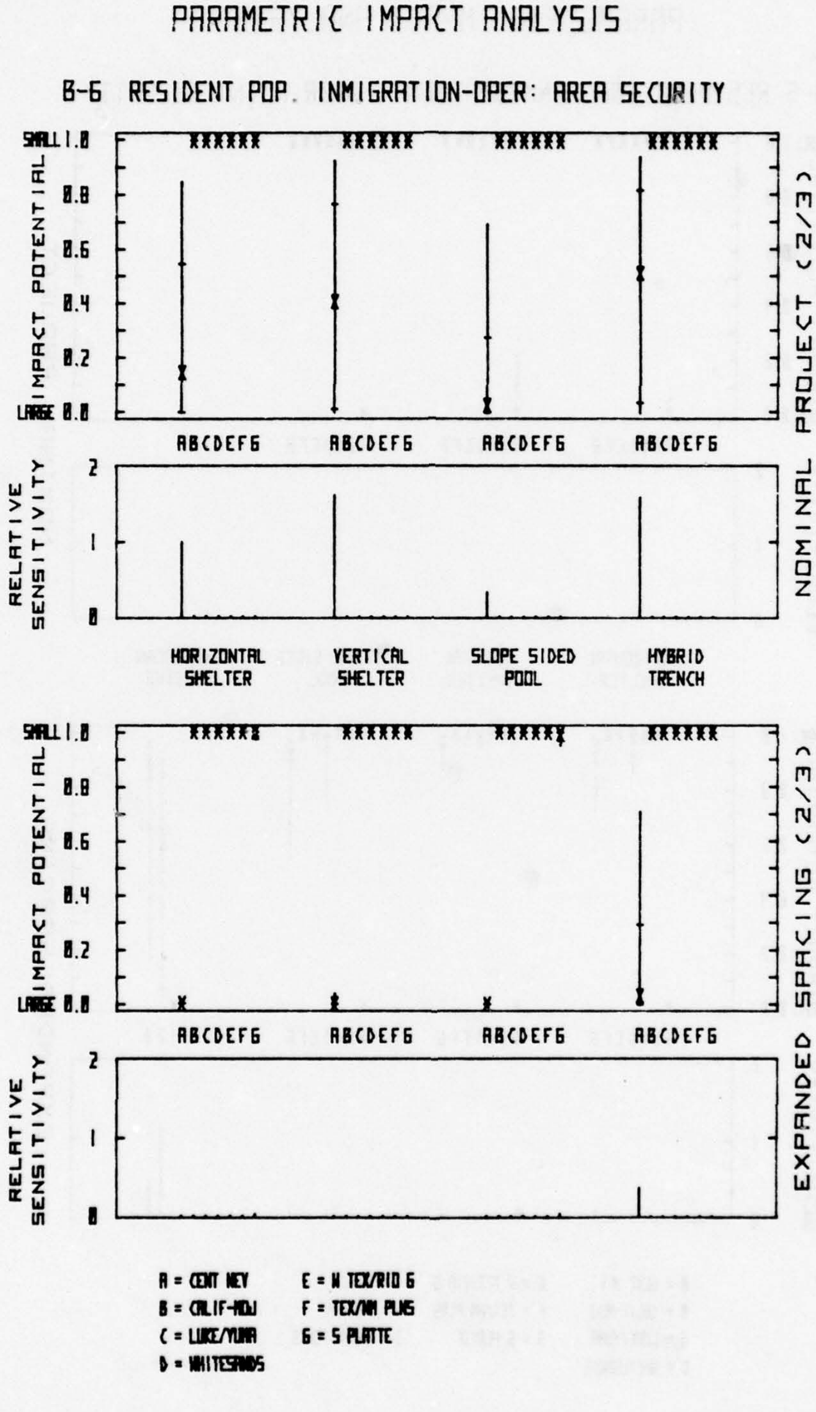

PARAMETRIC IMPACT ANALYSIS
B-6 RESIDENT POP. INMIGRATION-OPER: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (2/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-59

PARAMETRIC IMPACT ANALYSIS

B-6 RESIDENT POP. INMIGRATION-OPER.: POINT SECURITY

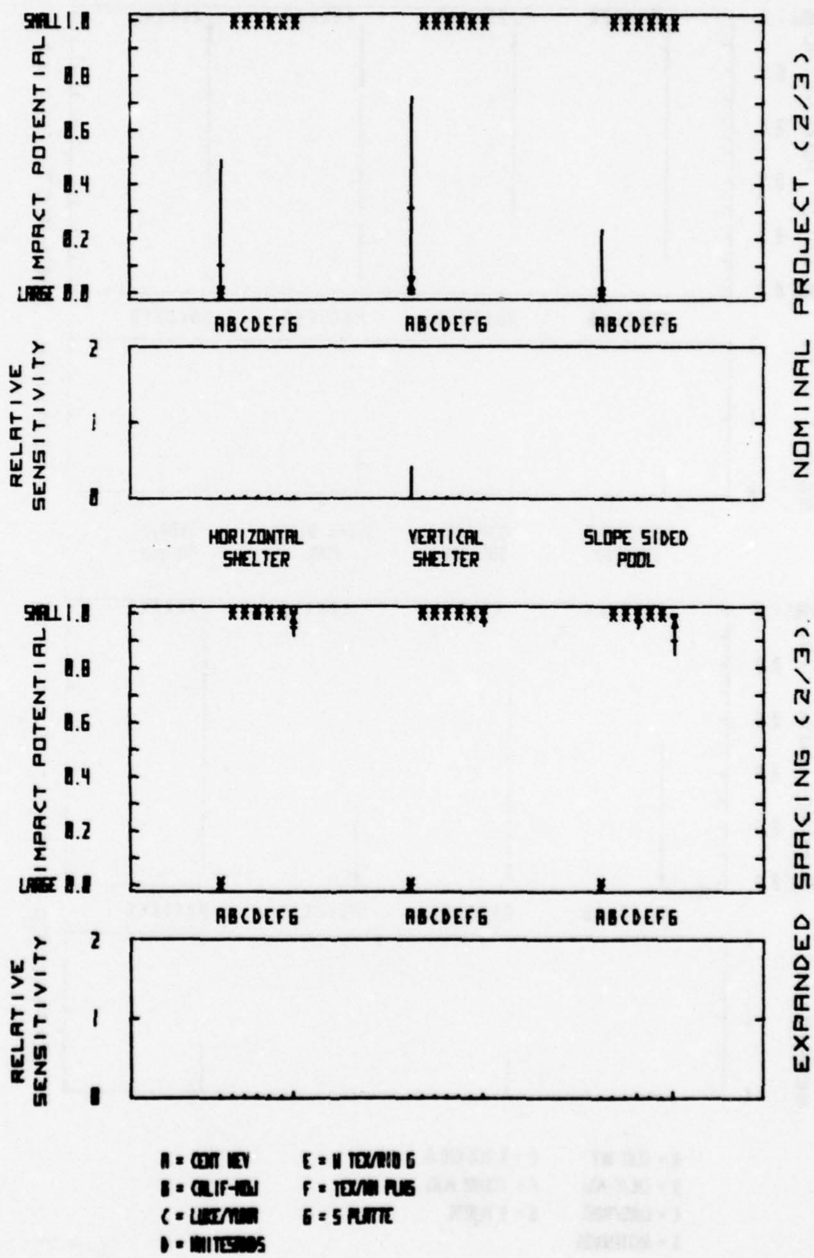


Figure B-60

PARAMETRIC IMPACT ANALYSIS

B-6 RESIDENT POP. INMIGRATION-OPER: AREA SECURITY

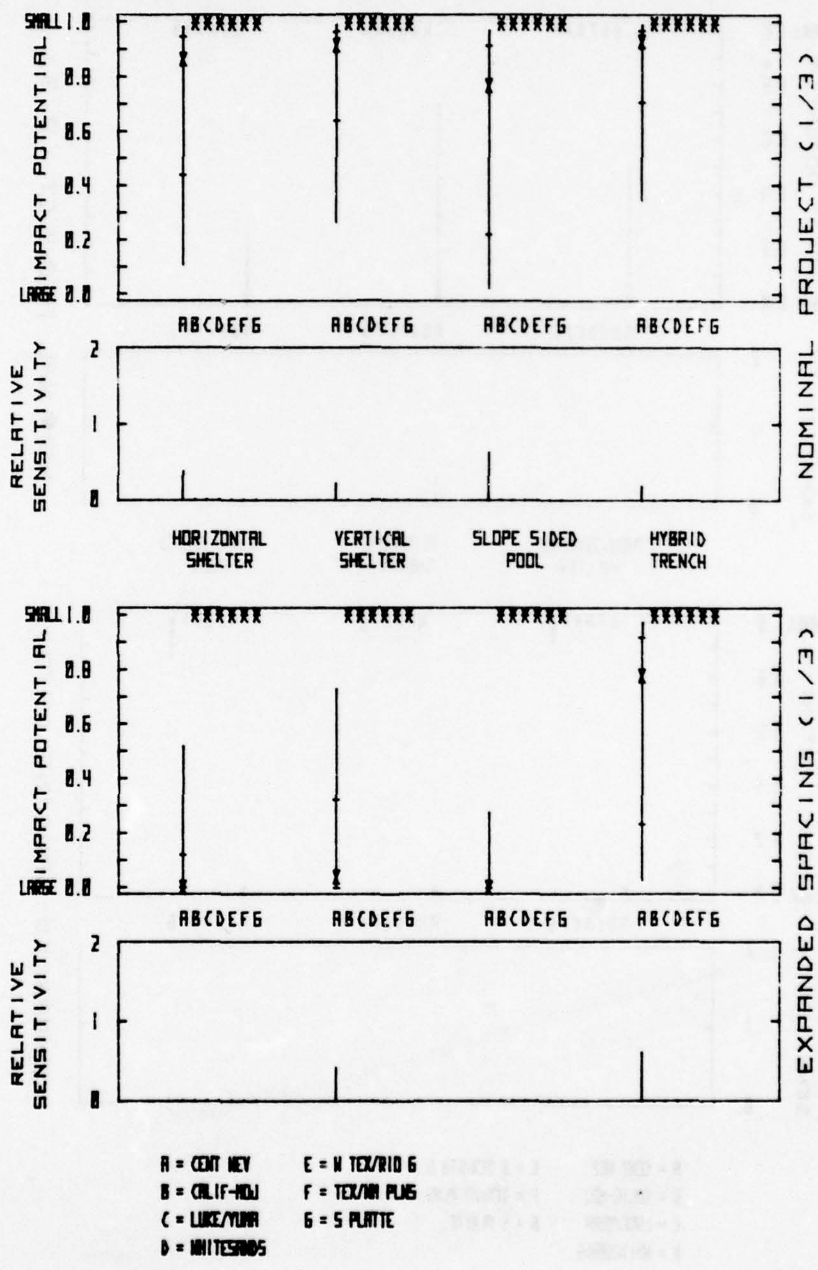


Figure B-61

PARAMETRIC IMPACT ANALYSIS

B-6 RESIDENT POP. INMIGRATION-OPER: POINT SECURITY

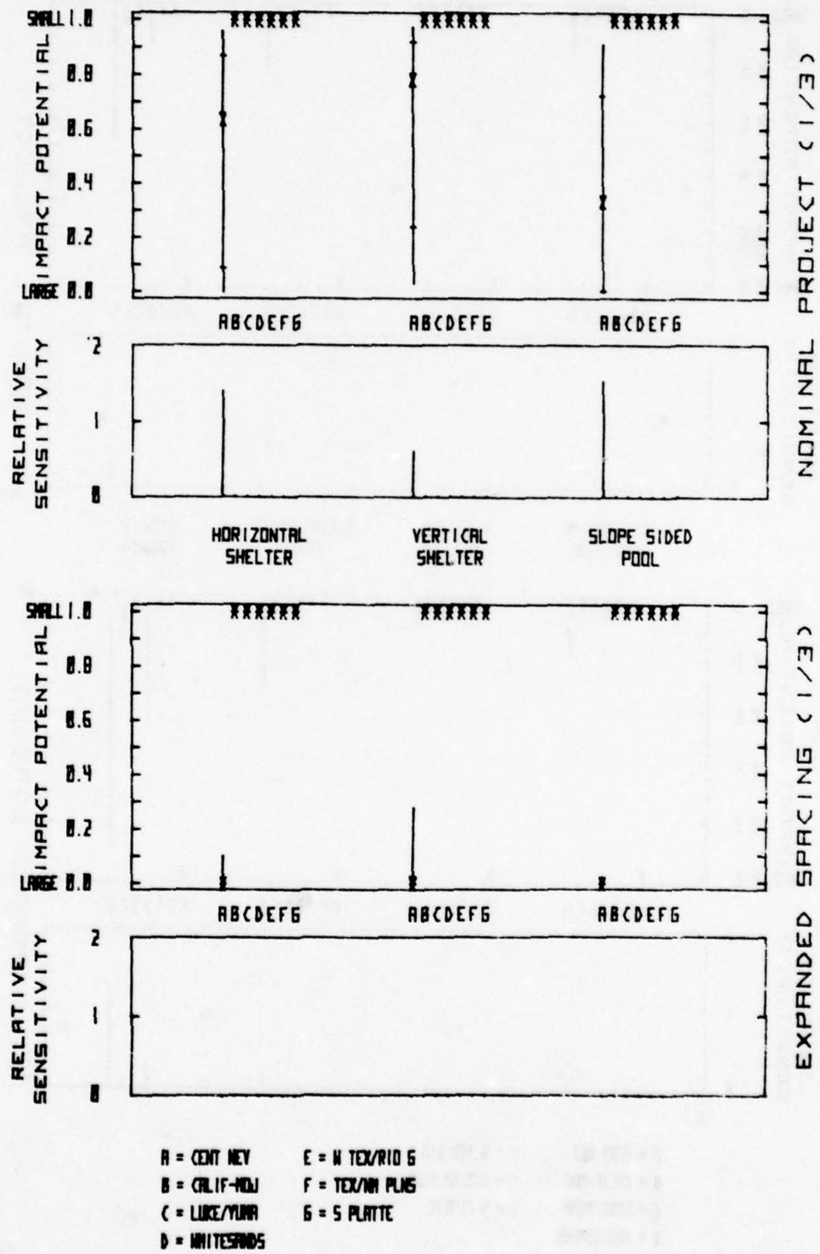


Figure B-62

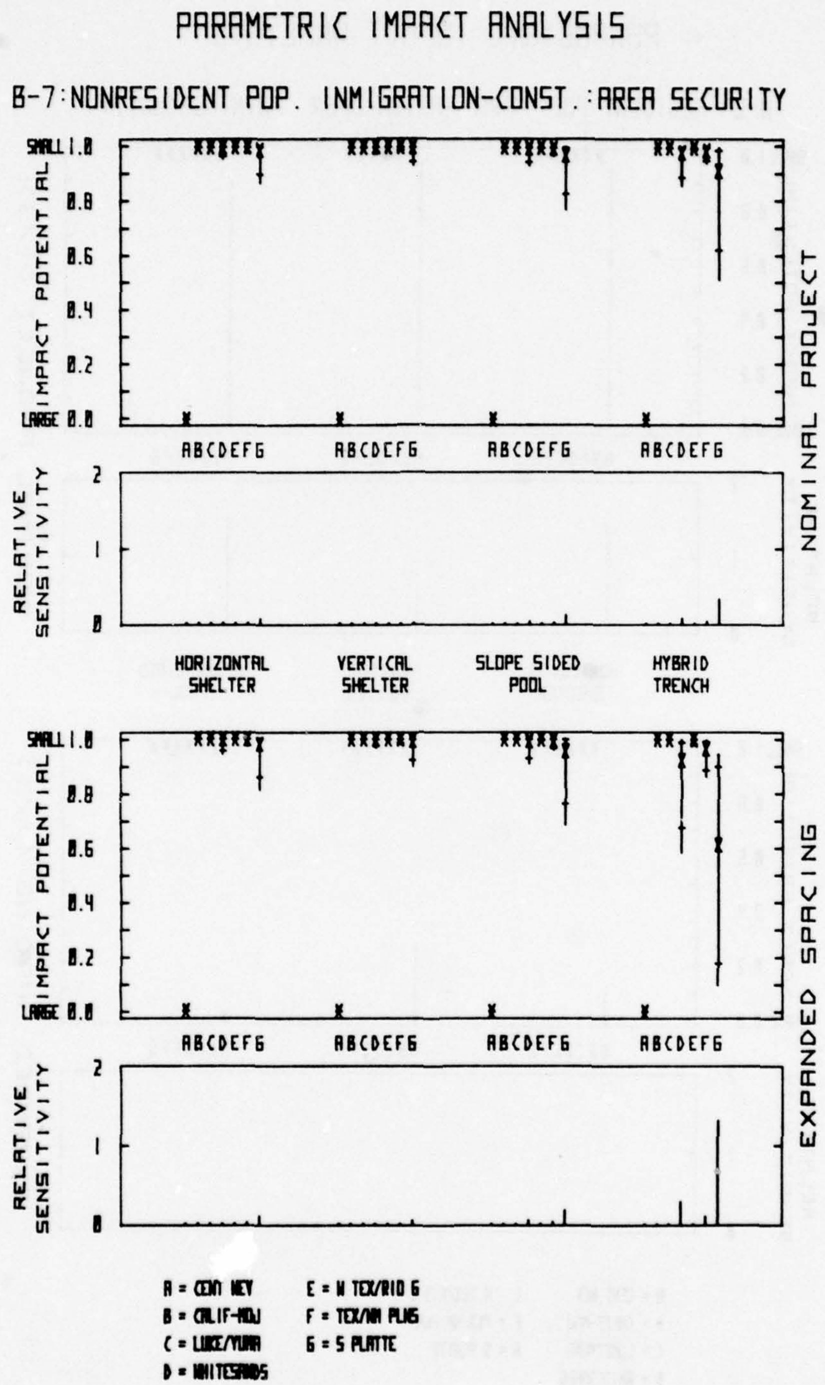

PARAMETRIC IMPACT ANALYSIS
B-7:NONRESIDENT POP. INMIGRATION-CONST.:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-63

PARAMETRIC IMPACT ANALYSIS

B-7: NONRESIDENT POP. INMIGRATION - CONSTR: POINT SECURITY

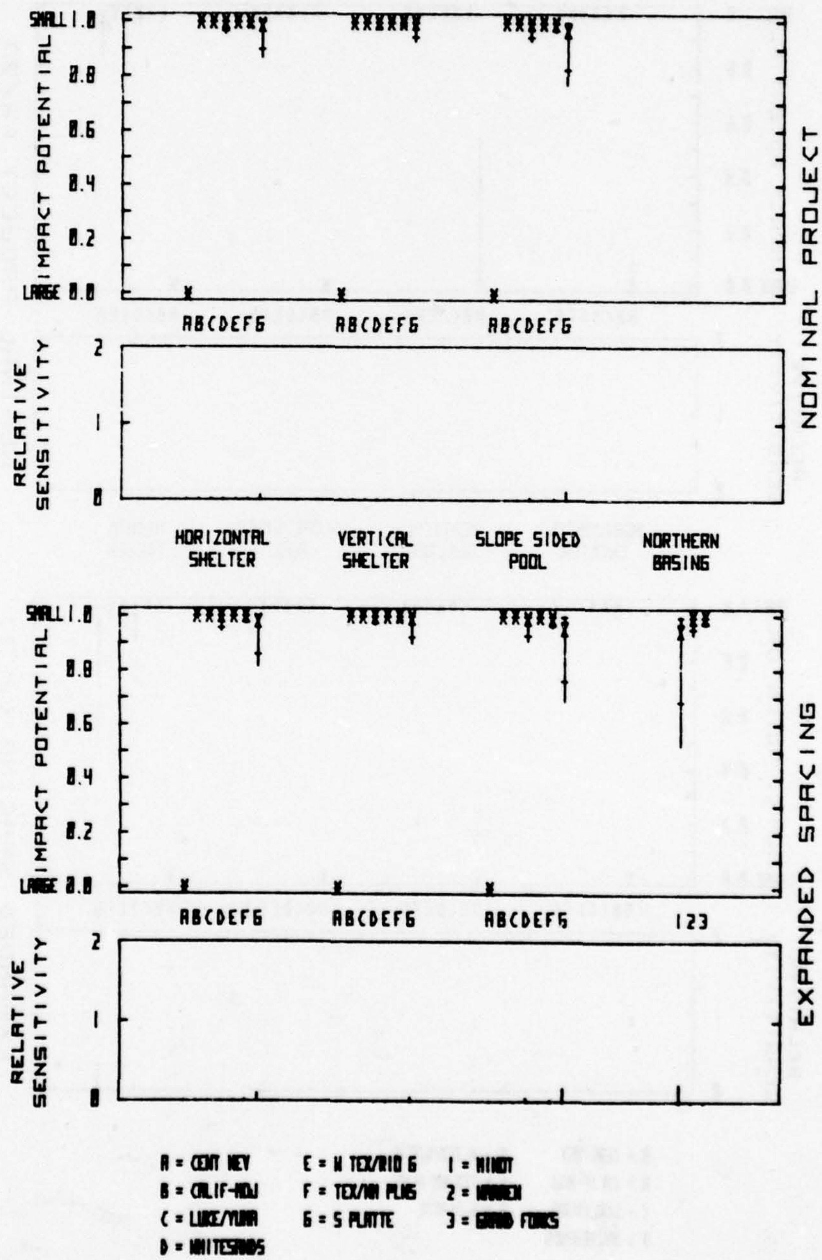


Figure B-64

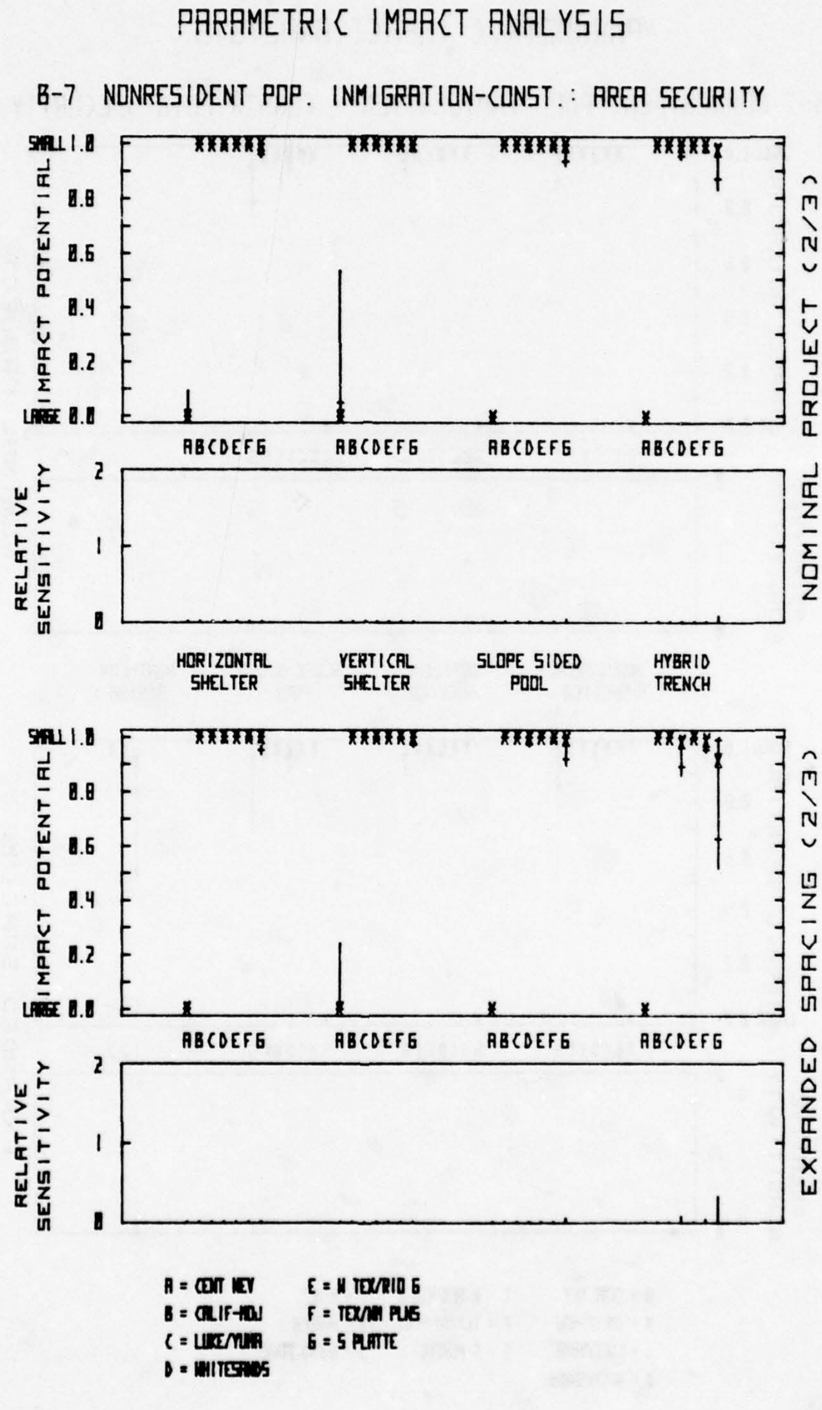

PARAMETRIC IMPACT ANALYSIS
B-7 NONRESIDENT POP. INMIGRATION-CONST.: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (2/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-65

PARAMETRIC IMPACT ANALYSIS

B-7 NONRESIDENT POP. INMIGRATION-OPER.: POINT SECURITY

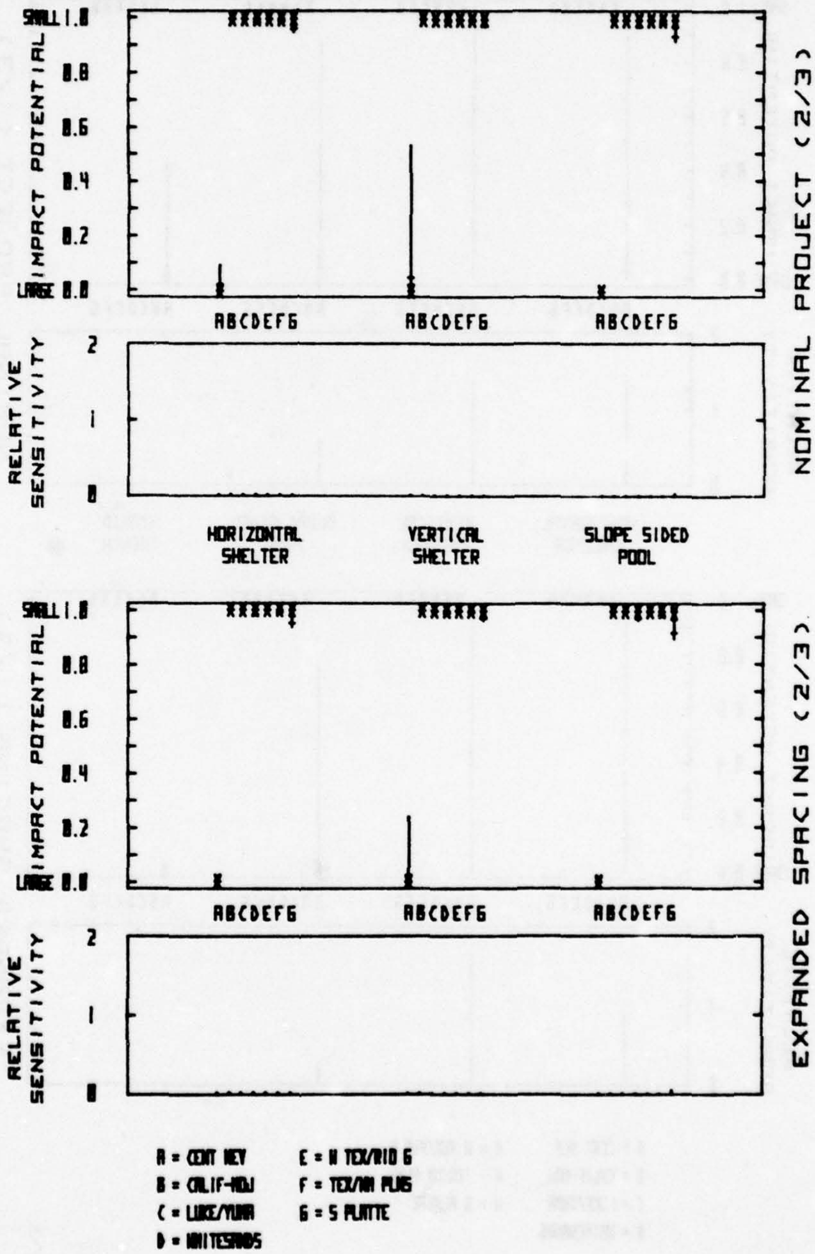


Figure B-66

PARAMETRIC IMPACT ANALYSIS

B-7 NONRESIDENT POP. IMMIGRATION-CONSTR.: AREA SECURITY

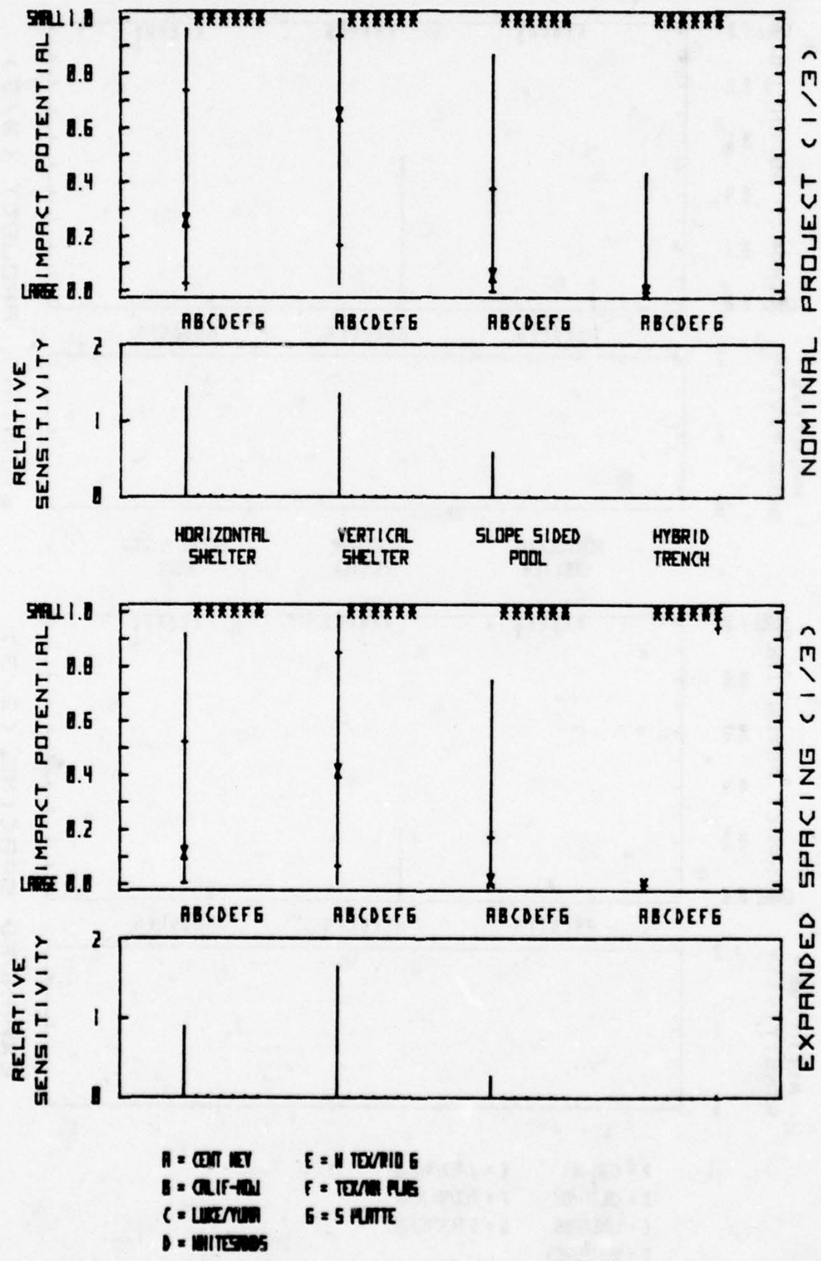


Figure B-67

PARAMETRIC IMPACT ANALYSIS

B-7 NONRESIDENT POP. INMIGRATION-CONSTR: POINT SECURITY

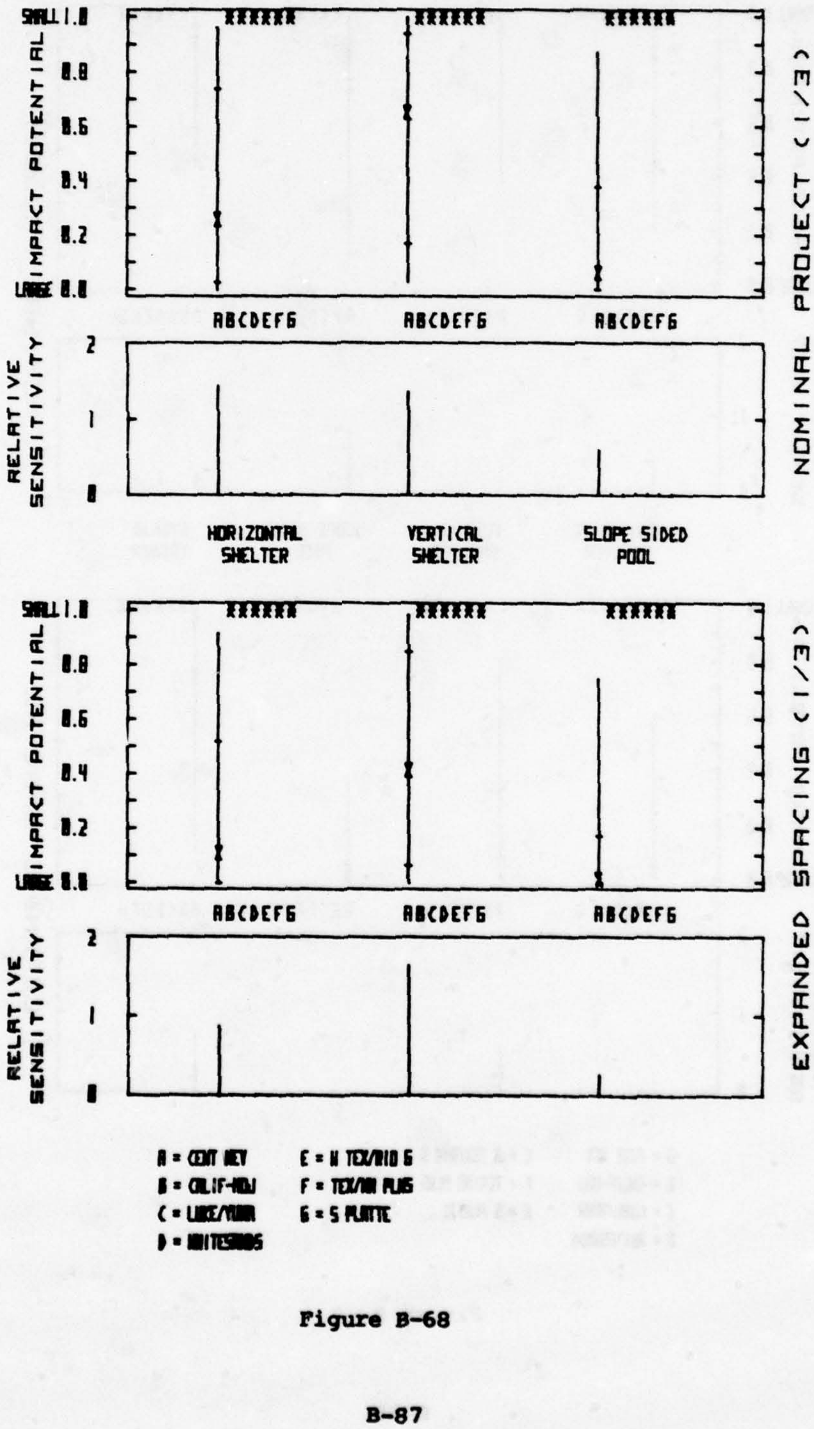


Figure B-68

PARAMETRIC IMPACT ANALYSIS

B-8: NONRESIDENT POP. INMIGRATION-OPER.: AREA SECURITY

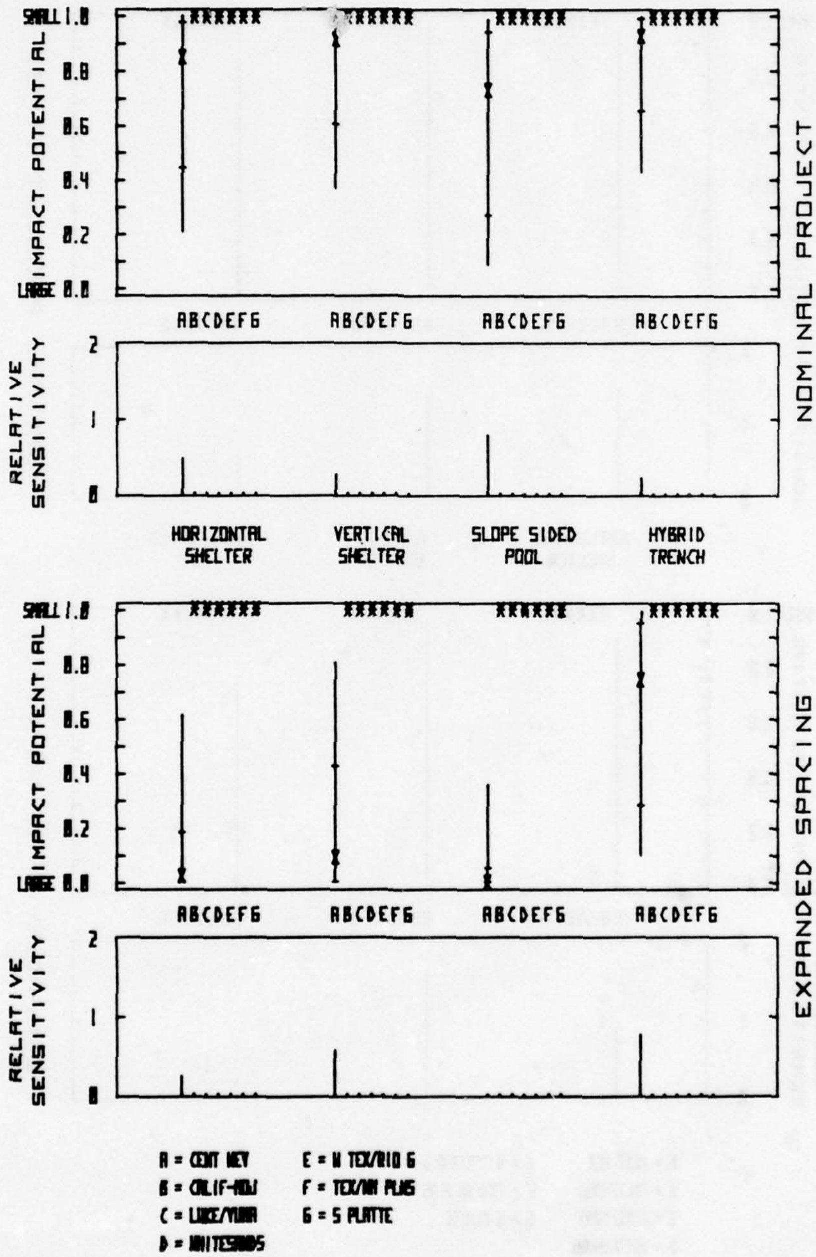


Figure B-69

PARAMETRIC IMPACT ANALYSIS

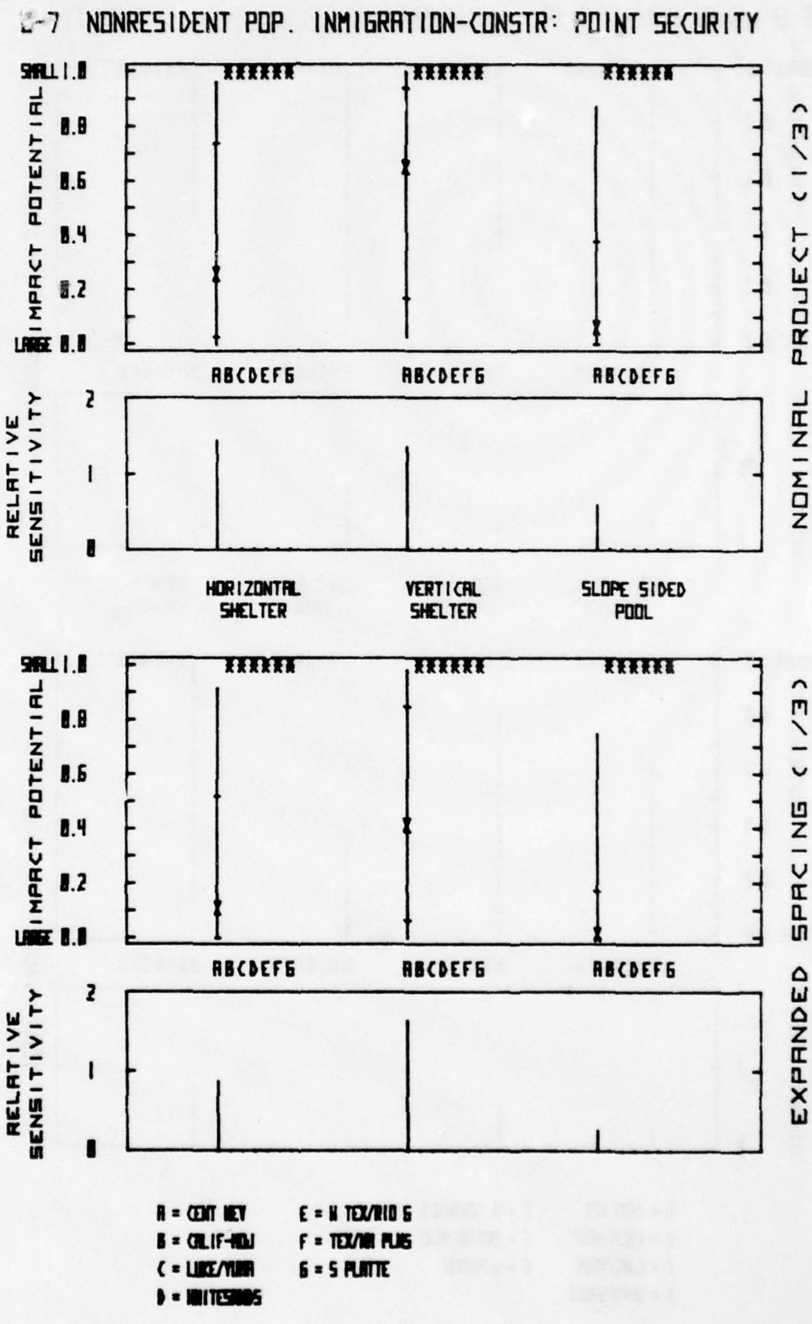


Figure B-68

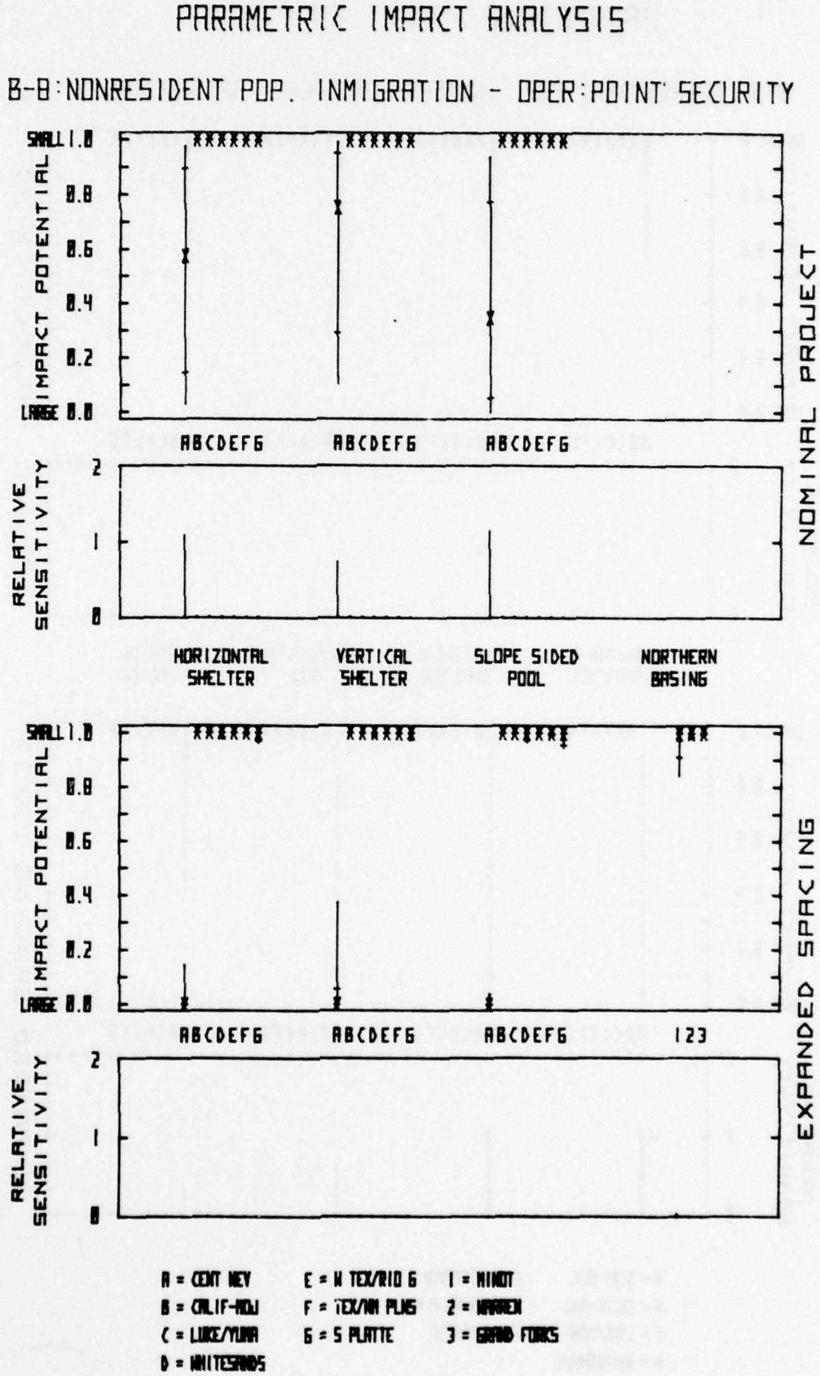

PARAMETRIC IMPACT ANALYSIS
B-8: NONRESIDENT POP. INMIGRATION - OPER: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
NOMINAL PROJECT
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-70

PARAMETRIC IMPACT ANALYSIS

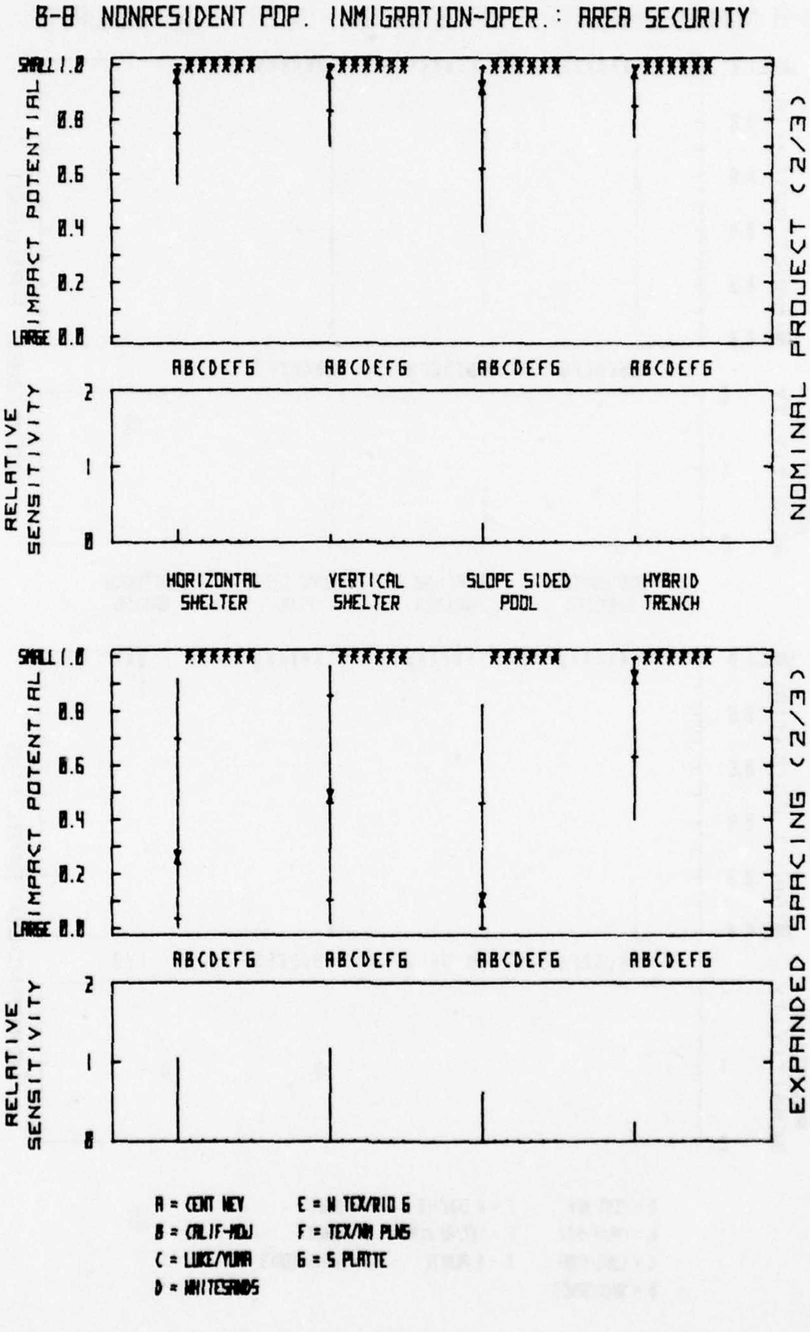


Figure B-71

PARAMETRIC IMPACT ANALYSIS

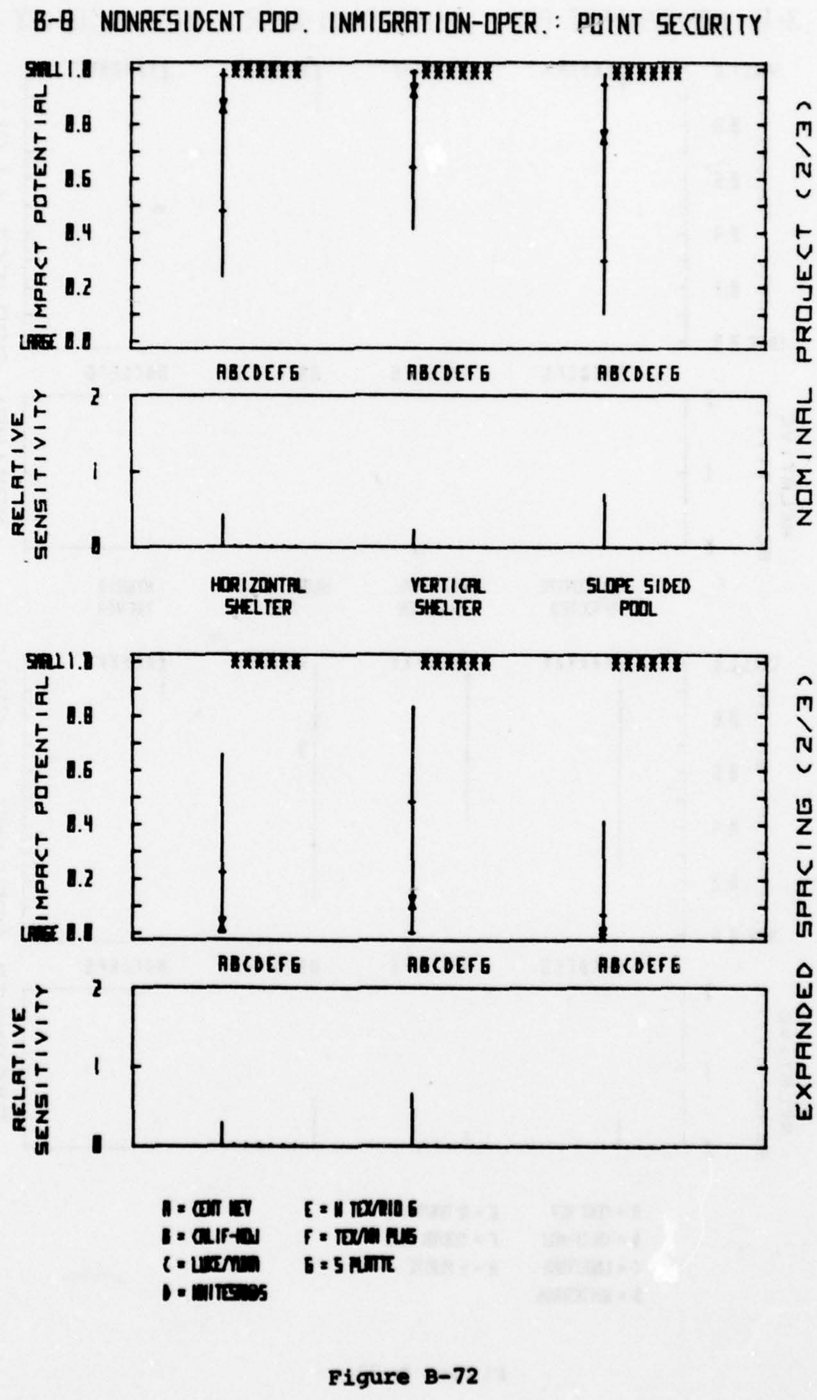


Figure B-72

PARAMETRIC IMPACT ANALYSIS

B-8 NONRESIDENT POP. INMIGRATION-OPER.: AREA SECURITY

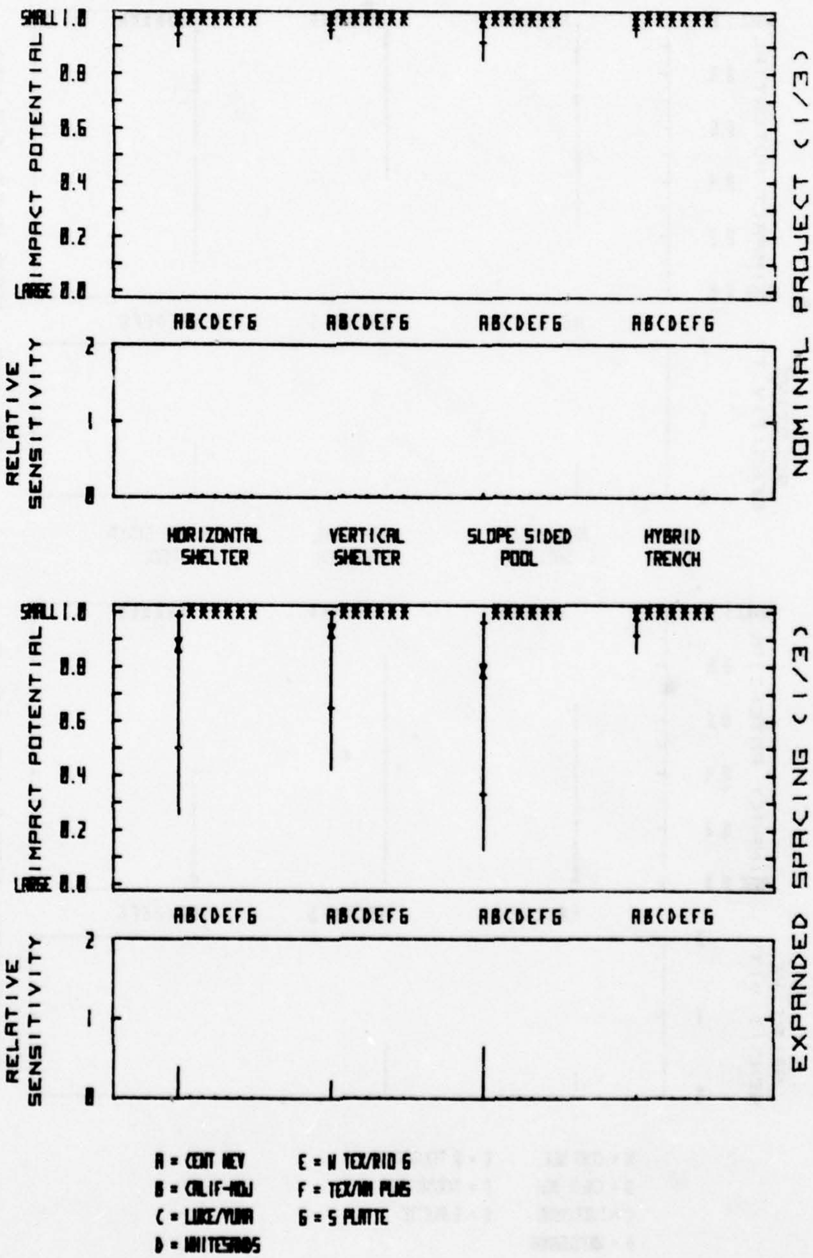


Figure B-73

PARAMETRIC IMPACT ANALYSIS

B-8 NONRESIDENT POP. INMIGRATION-OPER: POINT SECURITY

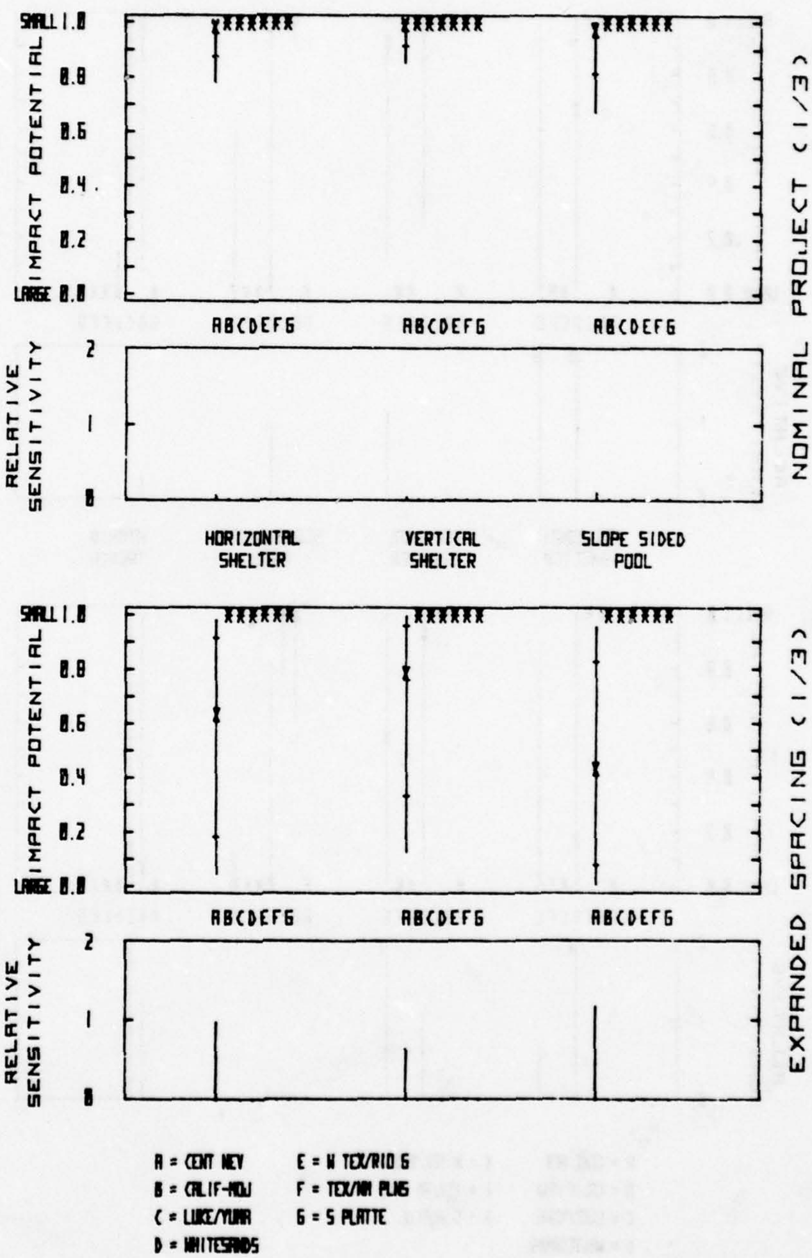


Figure B-74

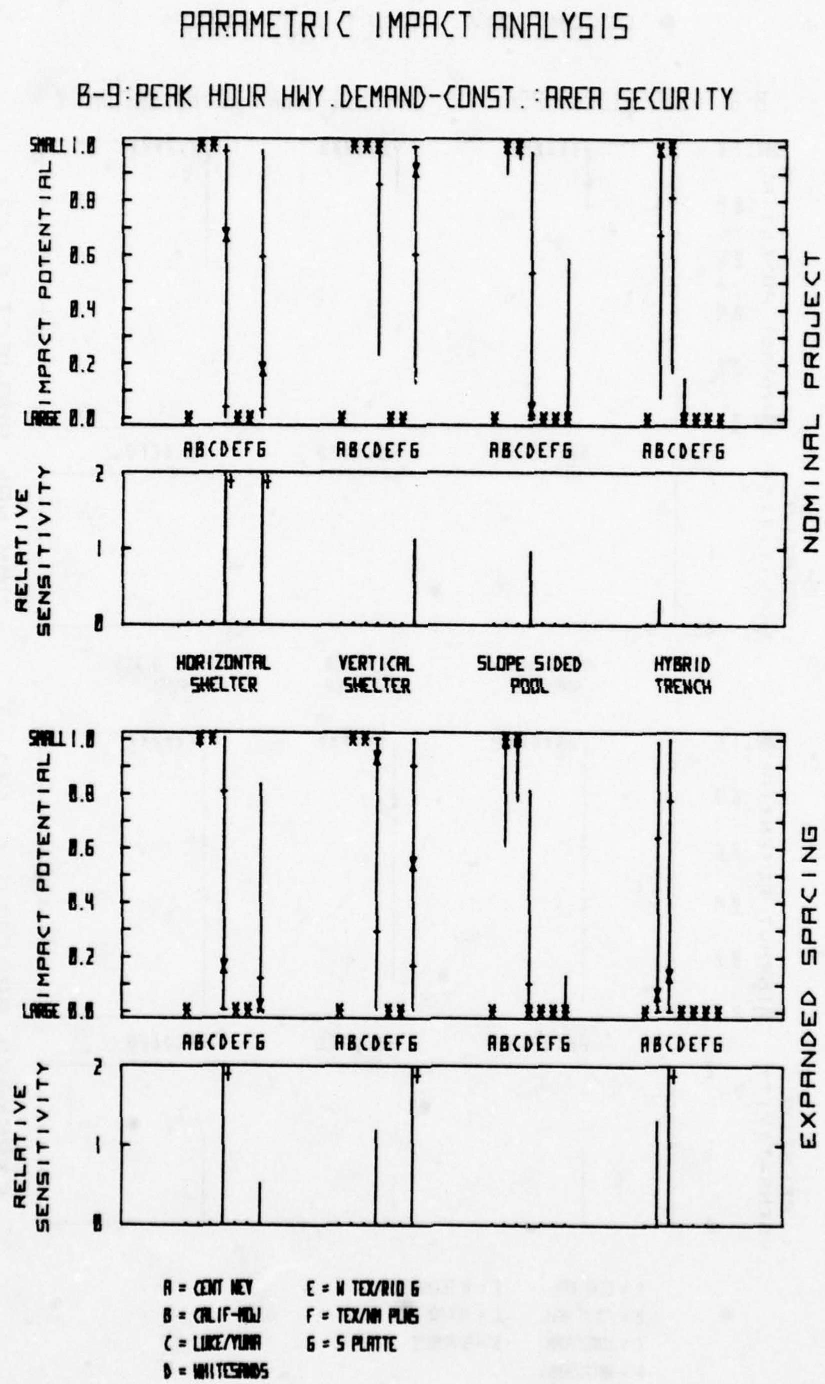

PARAMETRIC IMPACT ANALYSIS
B-9: PEAK HOUR HWY. DEMAND-CONST. : AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-75

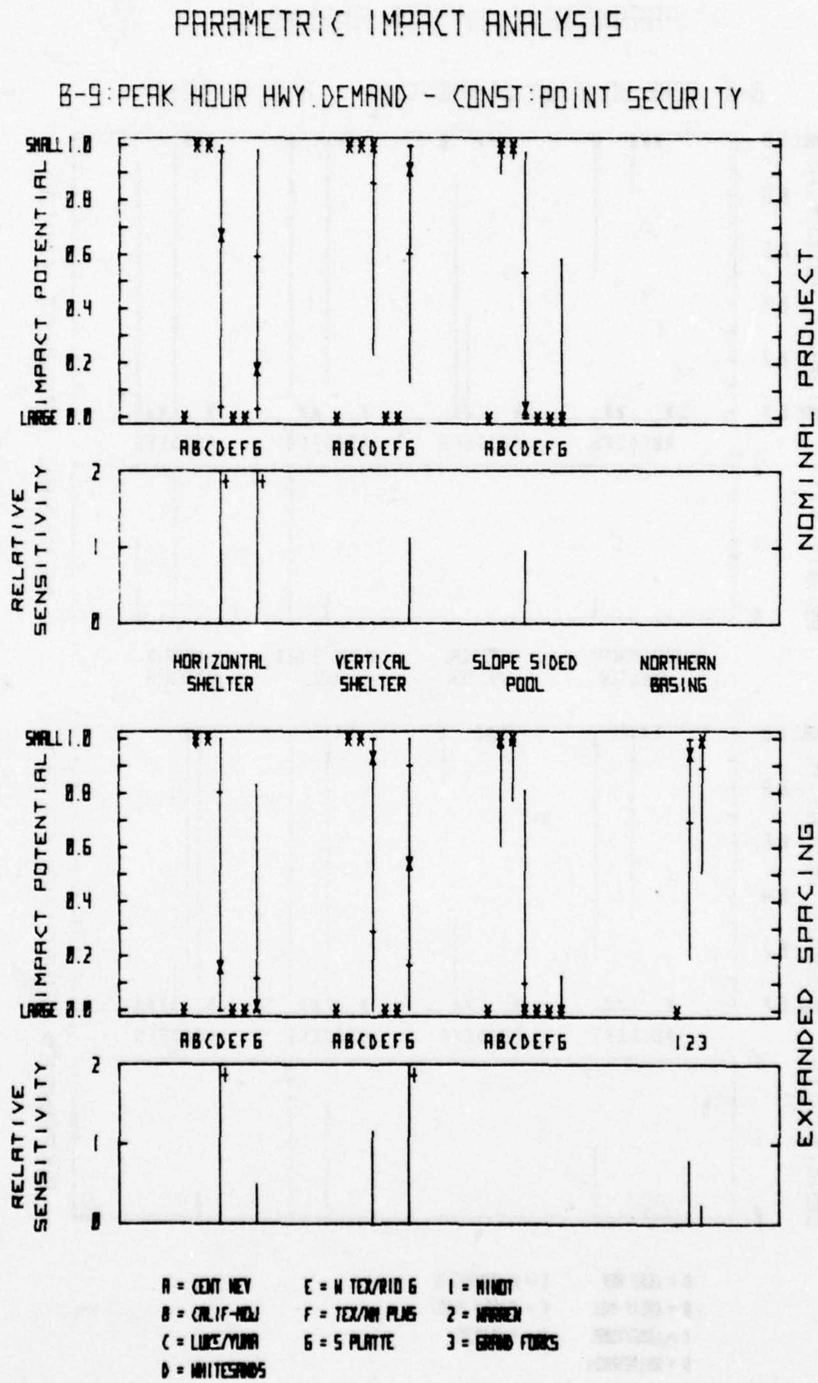

PARAMETRIC IMPACT ANALYSIS
B-9:PEAK HOUR HWY.DEMAND - CONST:POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
NOMINAL PROJECT
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-76

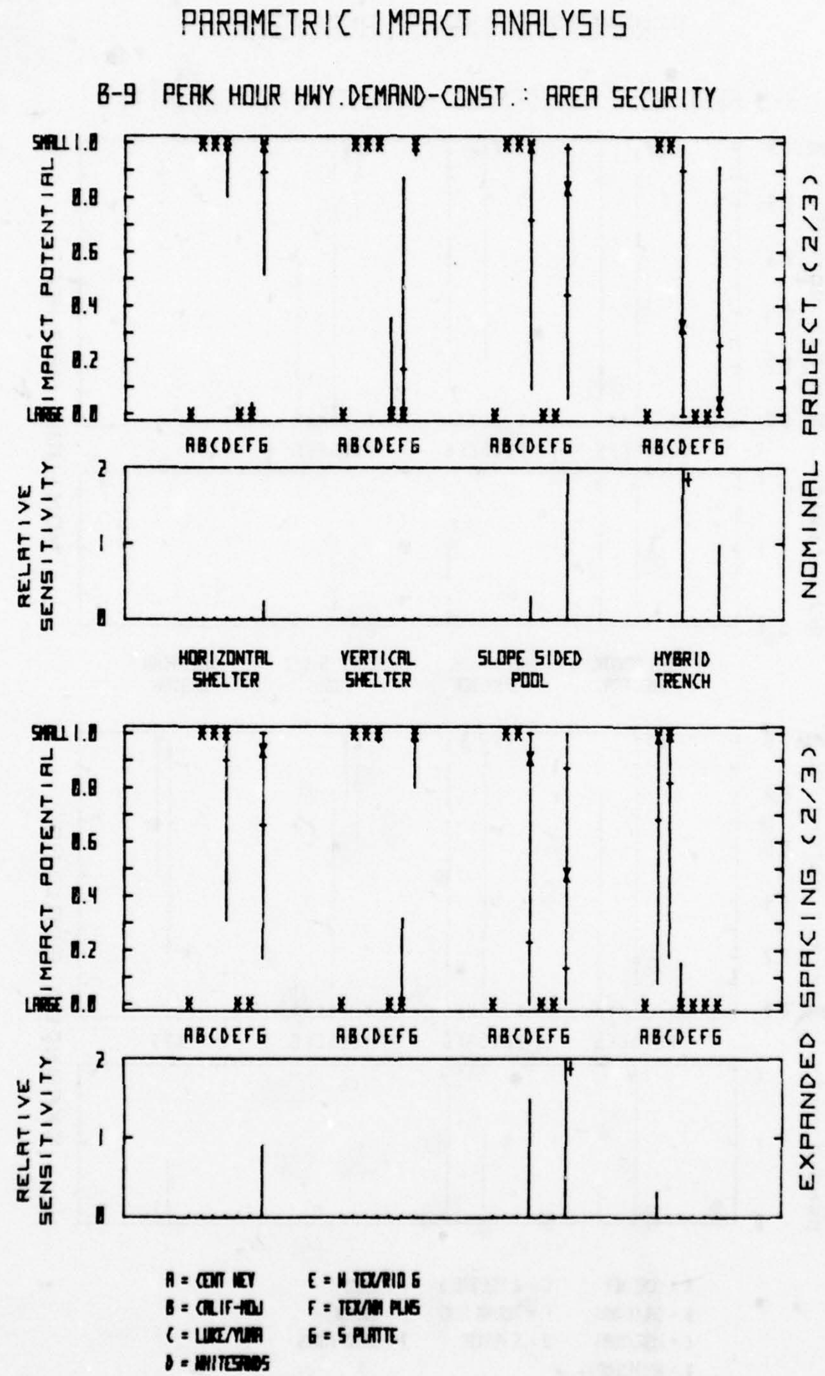

PARAMETRIC IMPACT ANALYSIS
B-9 PEAK HOUR HWY.DEMAND-CONST.: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (2/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-77

PARAMETRIC IMPACT ANALYSIS

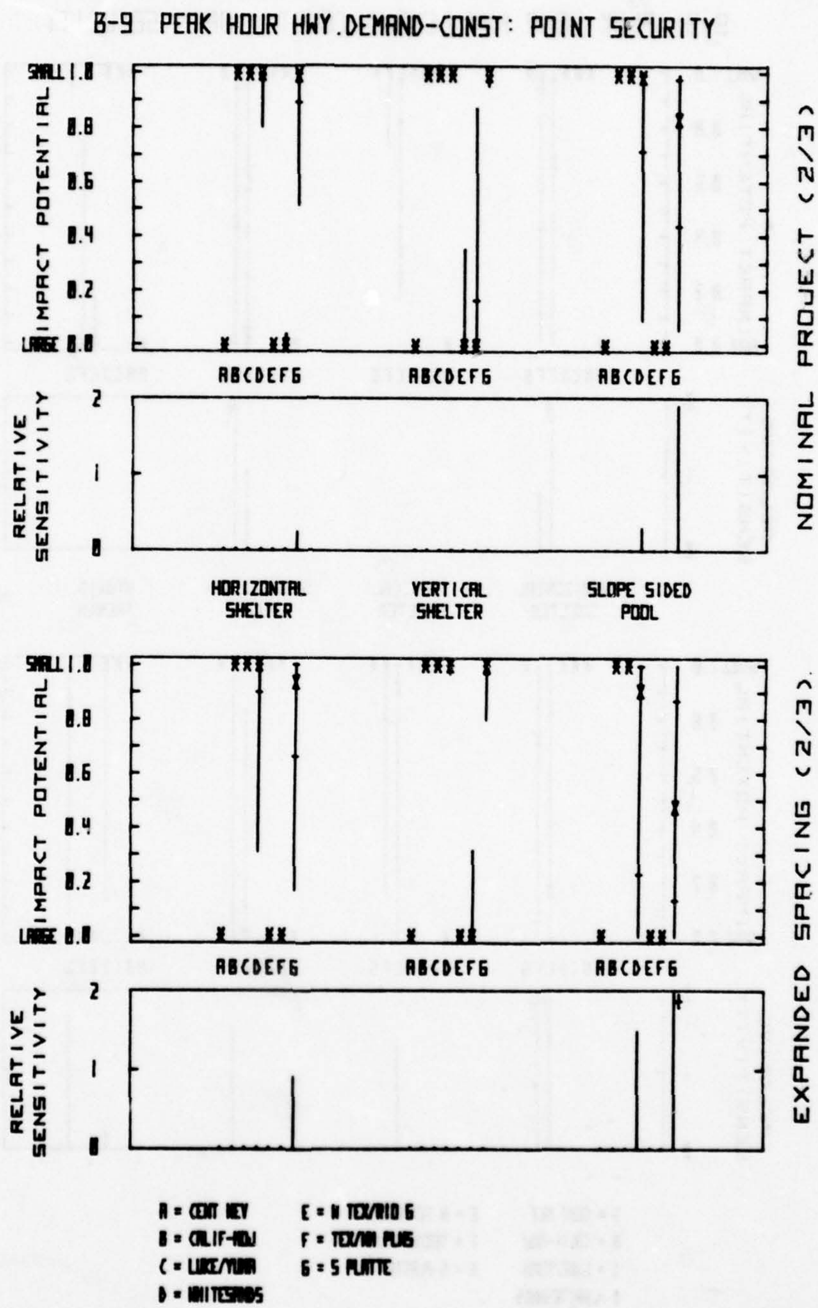
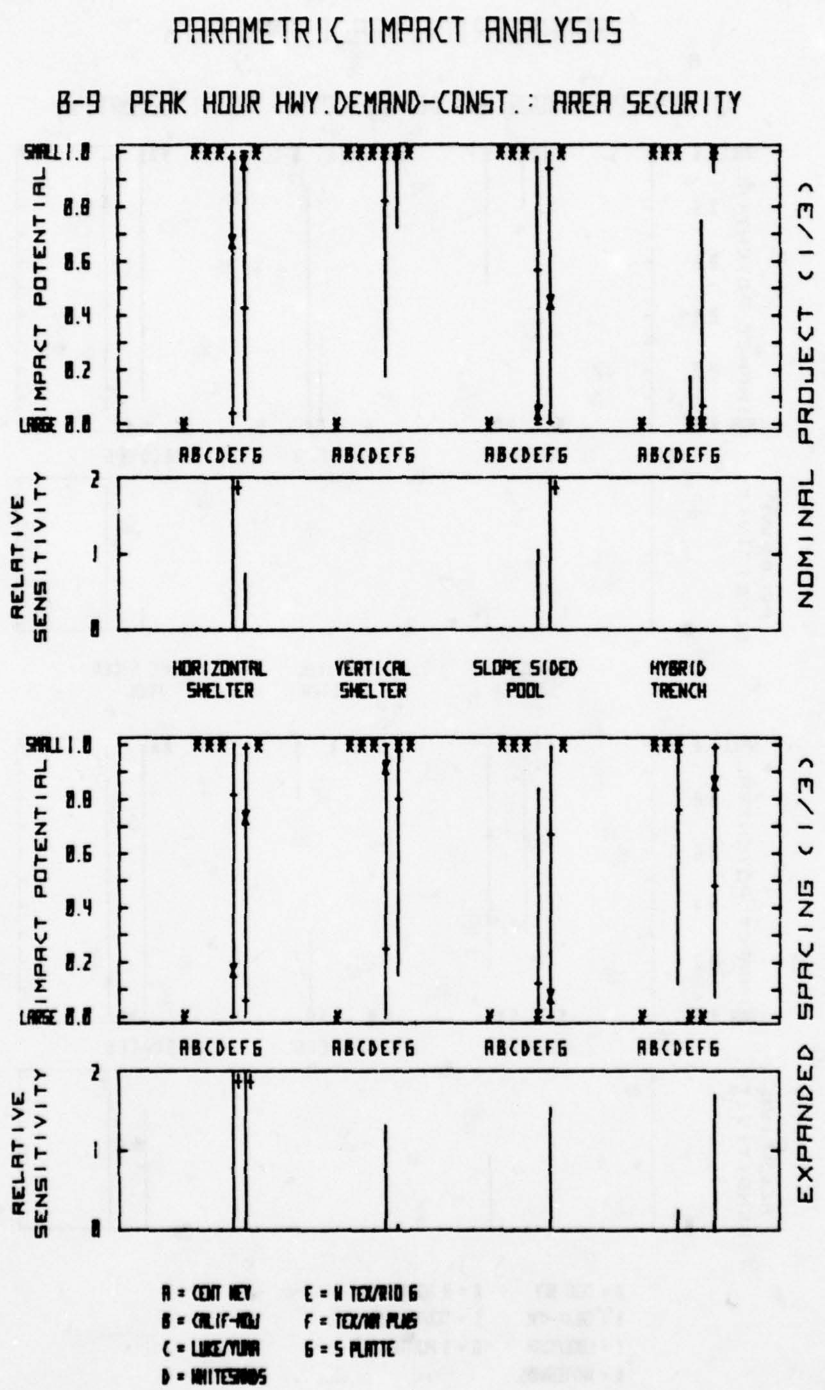


Figure B-78



PARAMETRIC IMPACT ANALYSIS
B-9 PEAK HOUR HWY.DEMAND-CONST.: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
NOMINAL PROJECT (1/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-79

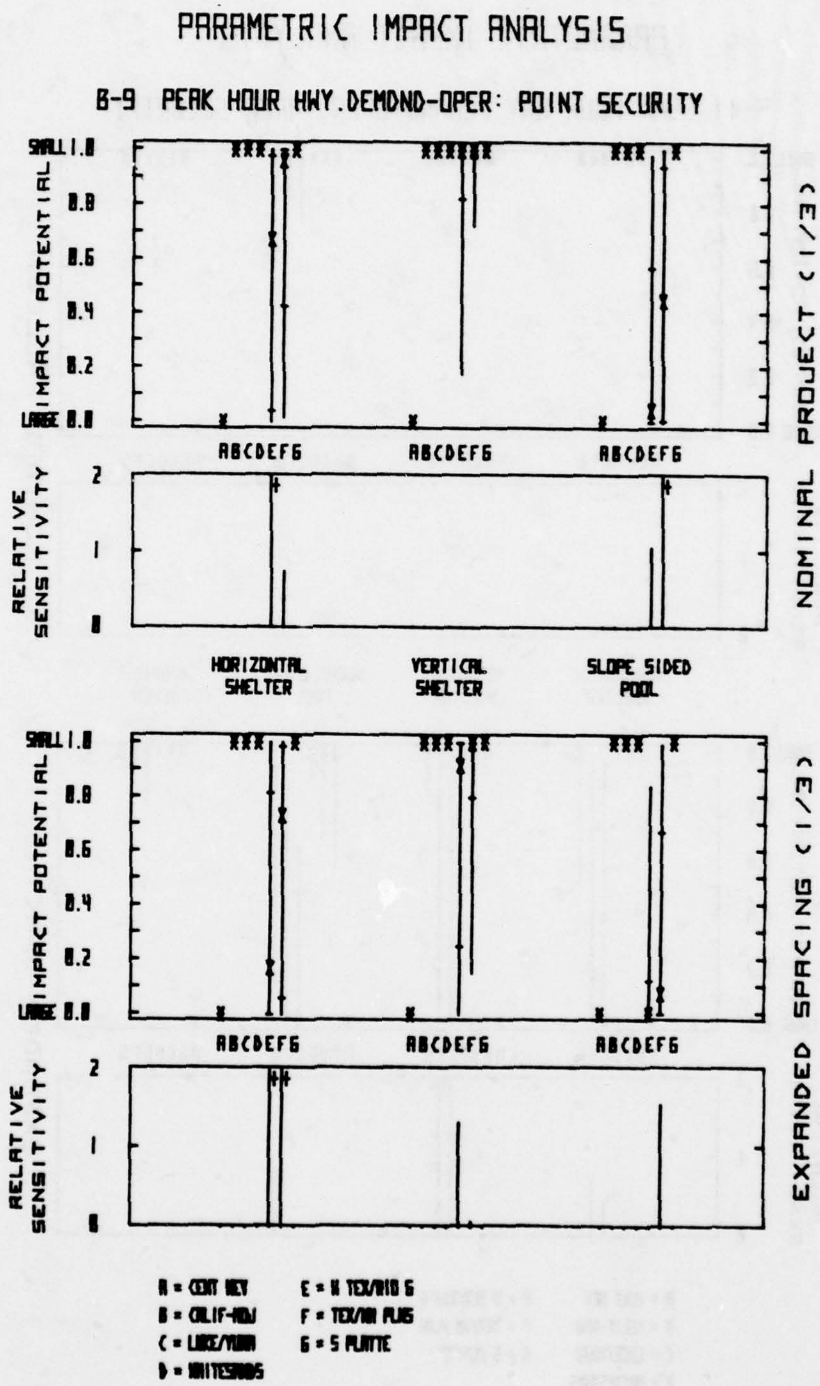

PARAMETRIC IMPACT ANALYSIS
B-9 PEAK HOUR HWY.DEMDND-OPER: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (1/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-80

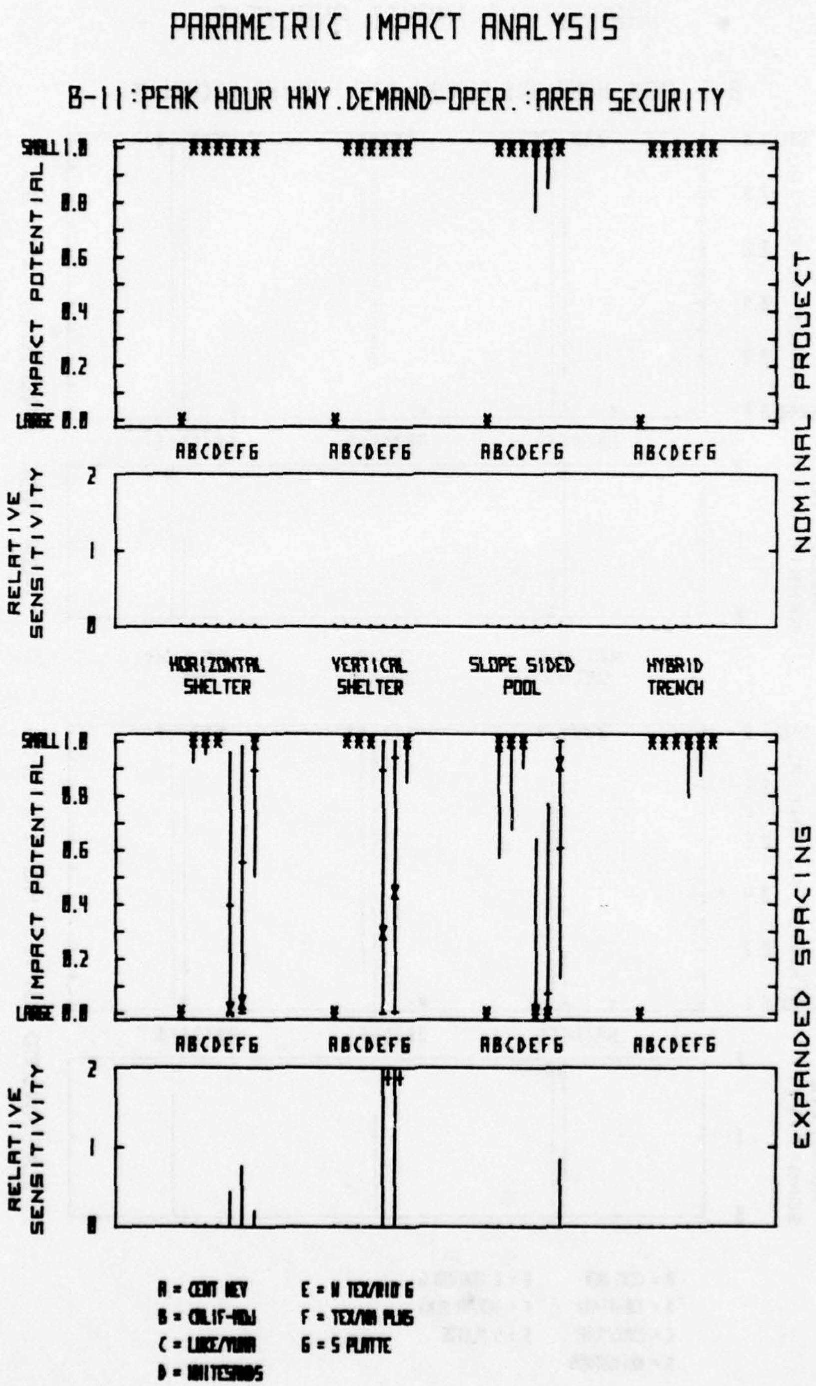

PARAMETRIC IMPACT ANALYSIS
B-11:PEAK HOUR HWY.DEMAND-OPER.:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LAKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-81

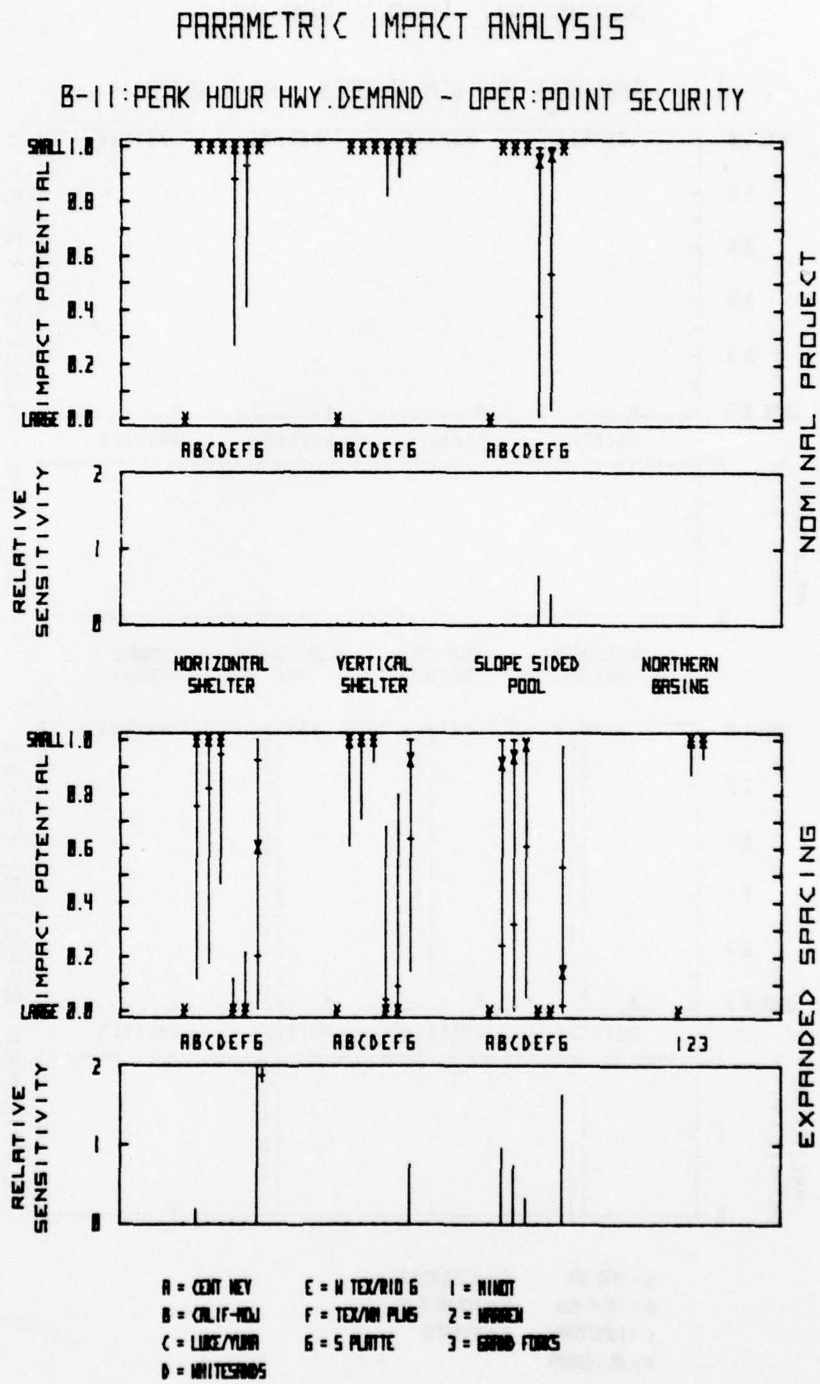

PARAMETRIC IMPACT ANALYSIS
B-11:PEAK HOUR HWY.DEMAND - OPER:POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-82

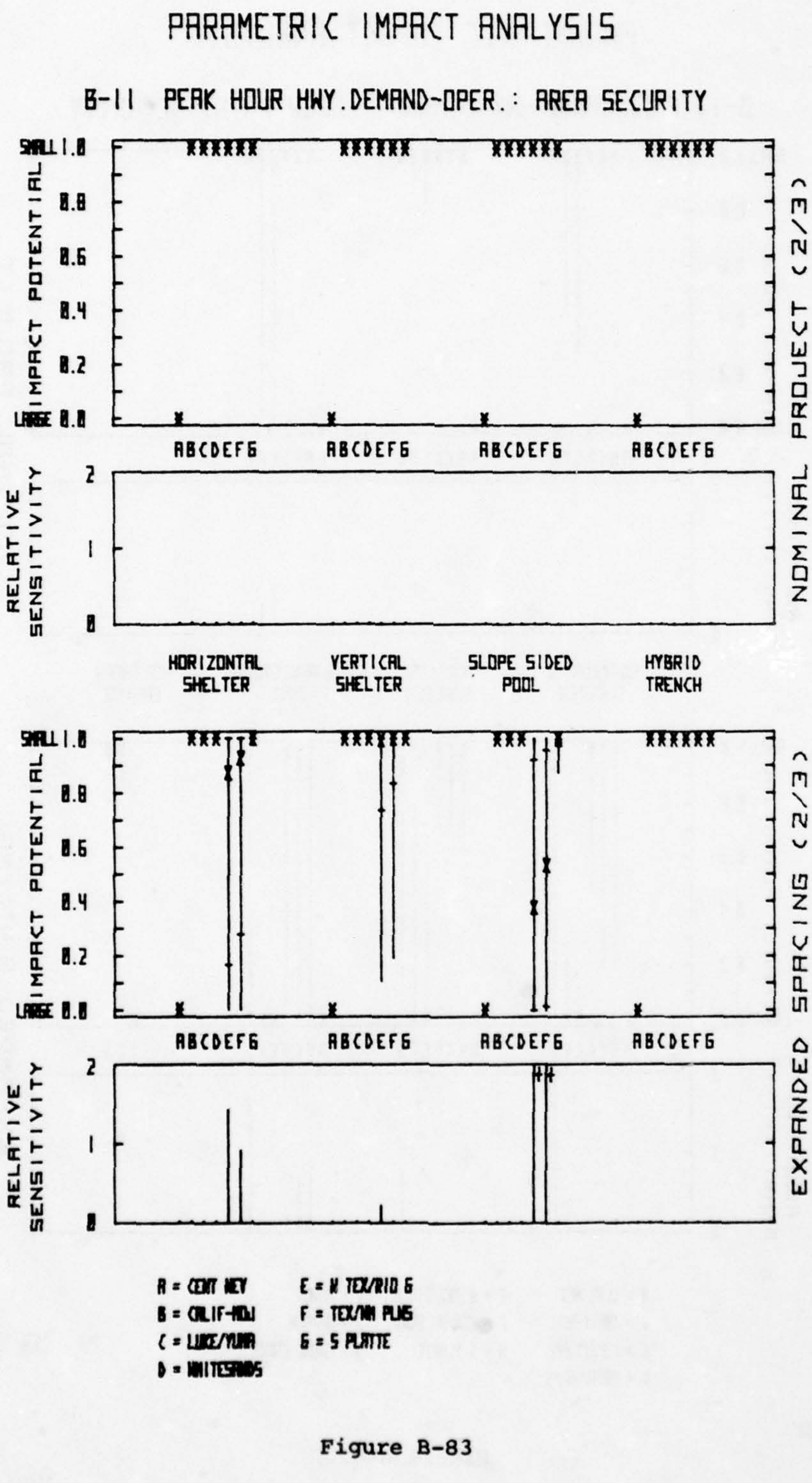

PARAMETRIC IMPACT ANALYSIS
B-11 PEAK HOUR HWY.DEMAND-OPER.: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-83

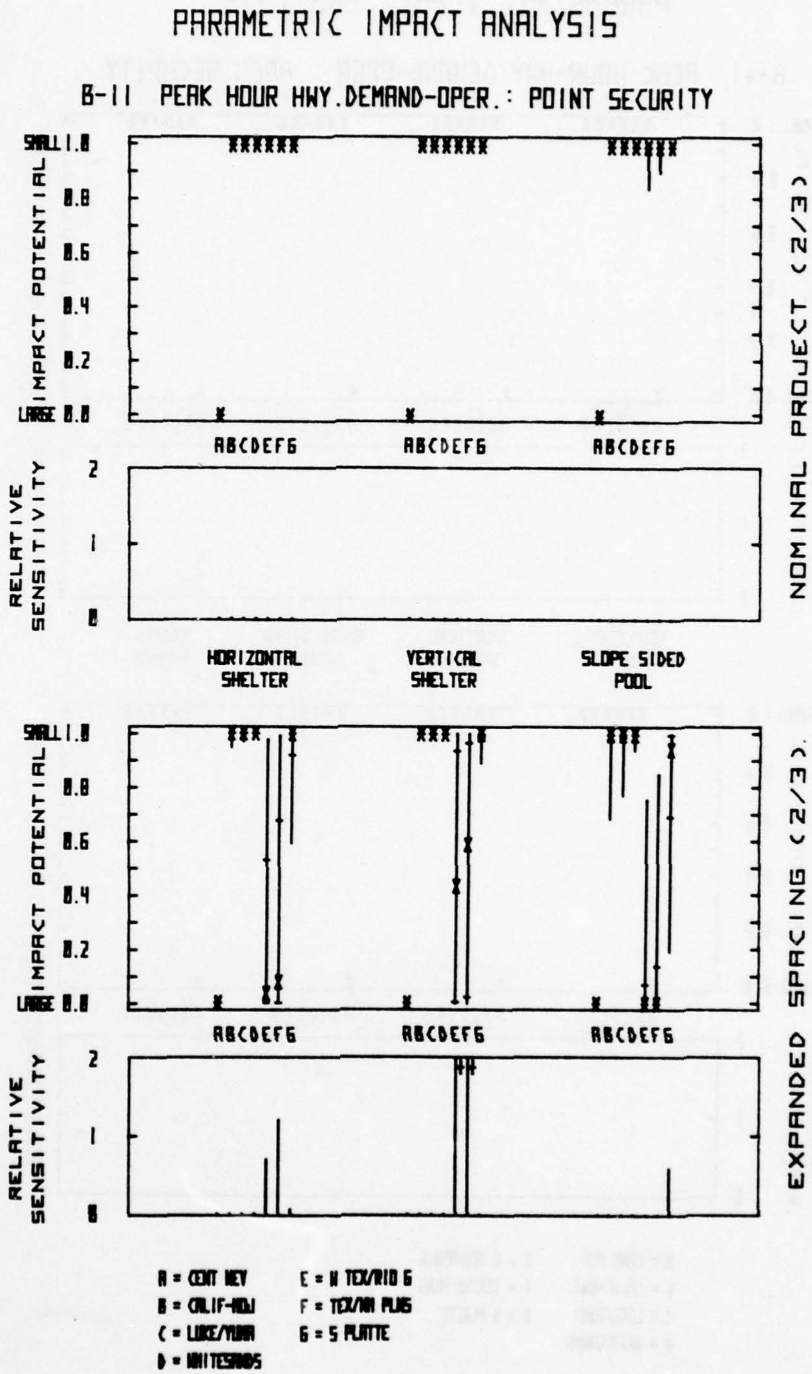

PARAMETRIC IMPACT ANALYSIS
B-11 PEAK HOUR HWY.DEMAND-OPER.: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-84

PARAMETRIC IMPACT ANALYSIS

B-11 PEAK HOUR HWY.DEMAND-OPER.: AREA SECURITY

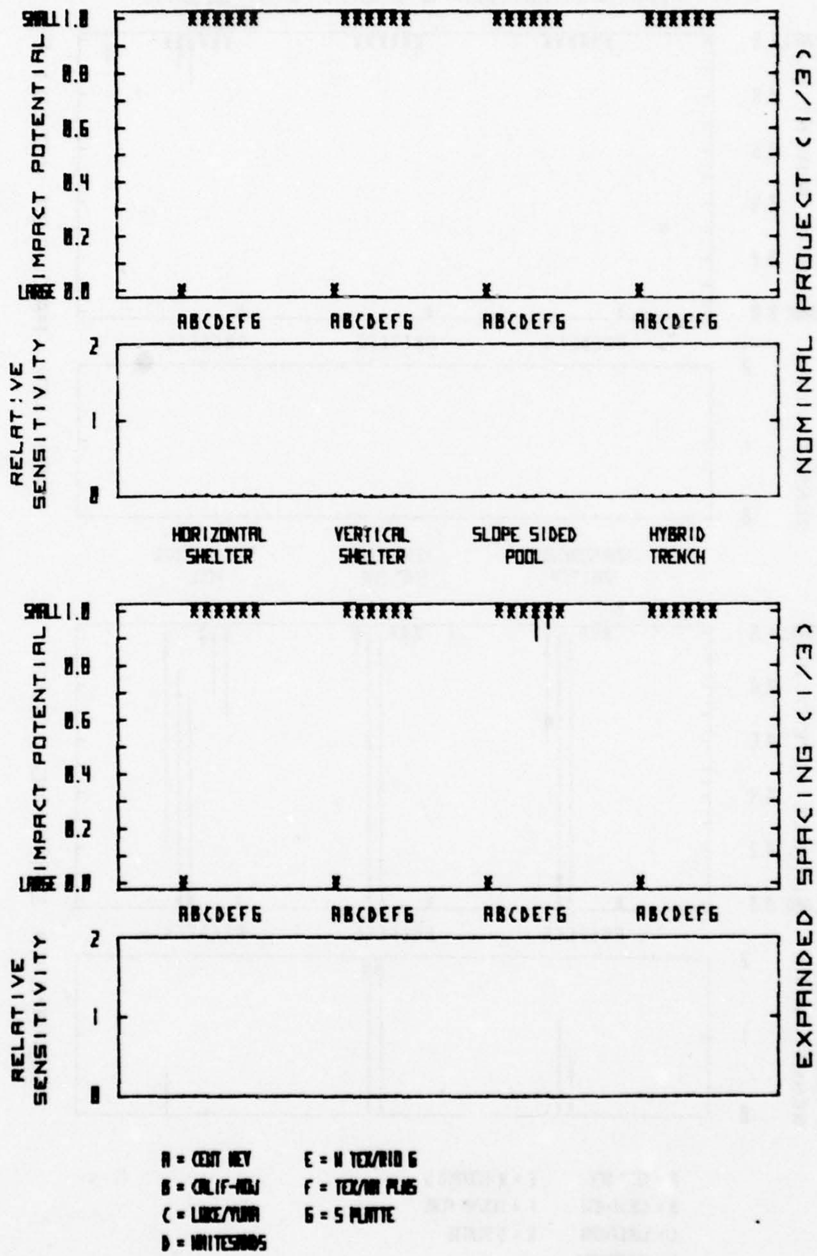


Figure B-85

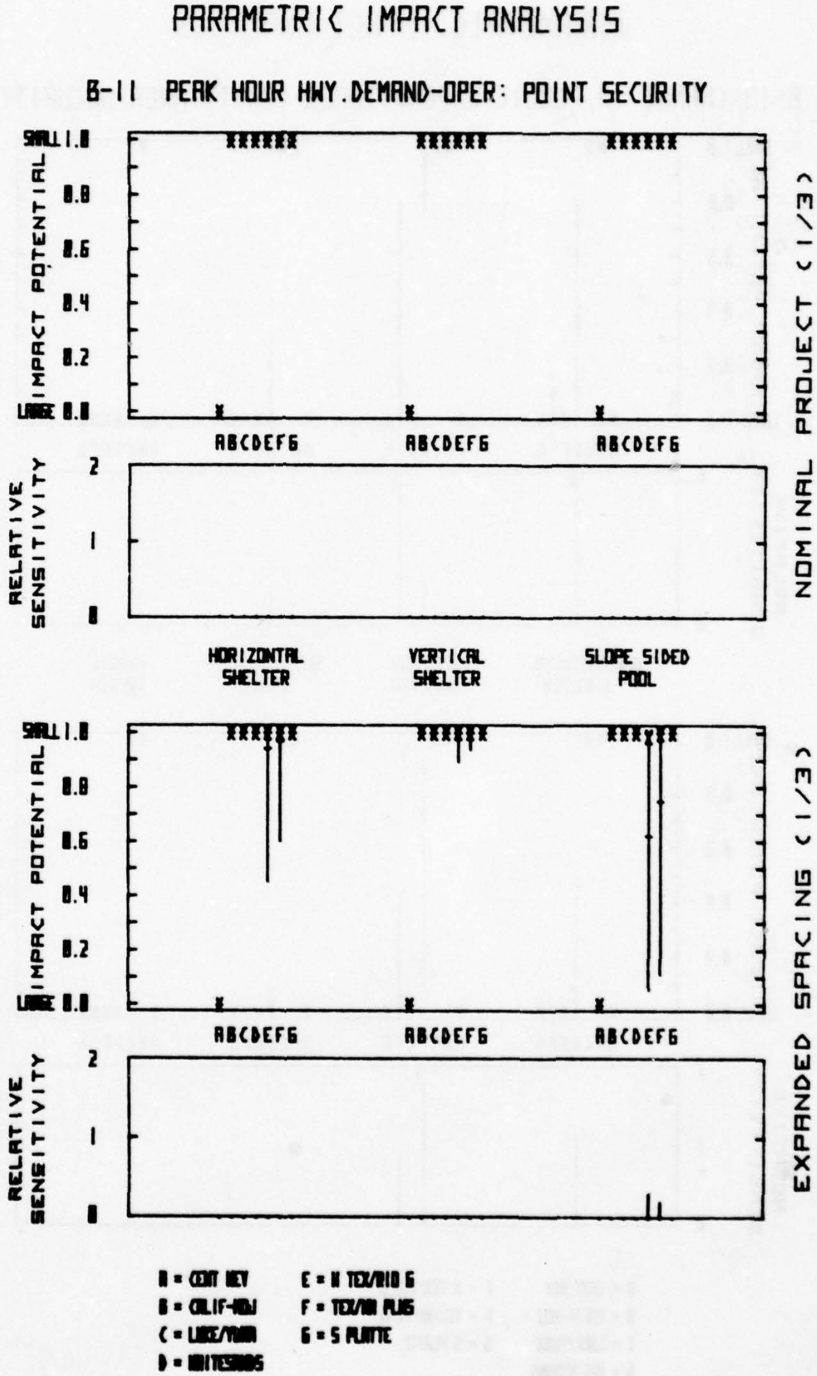

PARAMETRIC IMPACT ANALYSIS
B-11 PEAK HOUR HWY.DEMAND-OPER: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)

Figure B-86

PARAMETRIC IMPACT ANALYSIS

B-13:CHANGE IN PUBLIC EXPENDITURES-CONST.:AREA SECURITY

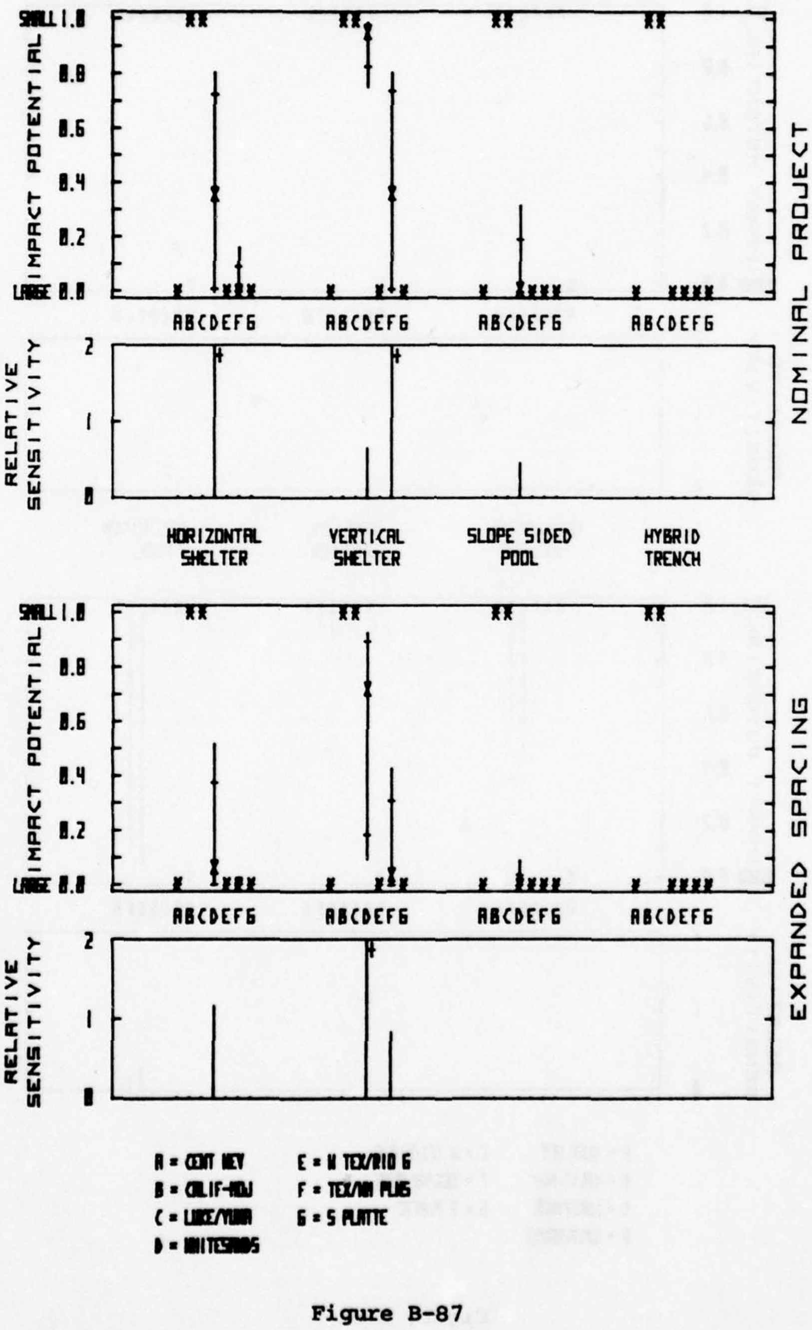


Figure B-87

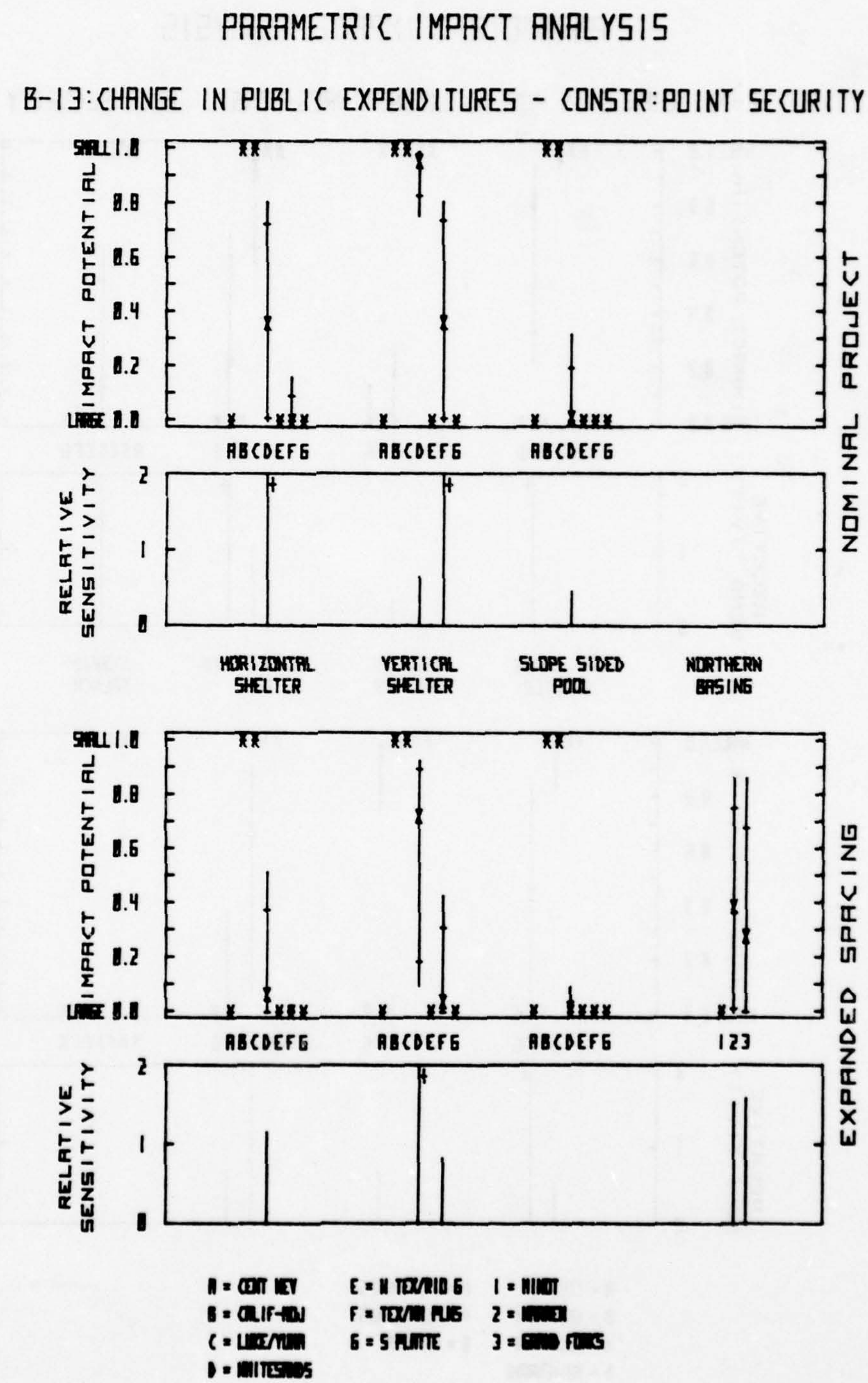

PARAMETRIC IMPACT ANALYSIS
B-13:CHANGE IN PUBLIC EXPENDITURES - CONSTR:POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
NOMINAL PROJECT
EXPANDED SPACING

Figure B-88

PARAMETRIC IMPACT ANALYSIS

B-13 CHANGE IN PUBLIC EXPENDITURES-CONST.: AREA SECURITY

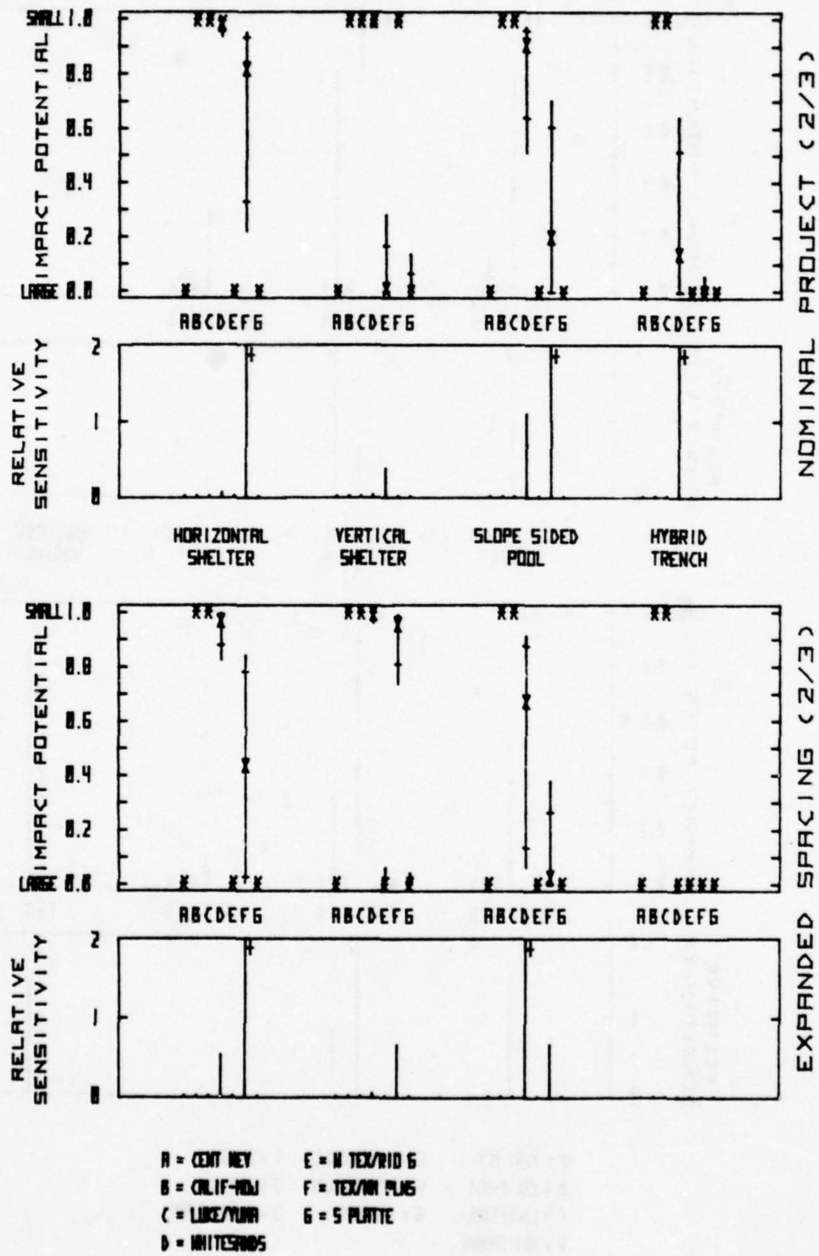


Figure B-89

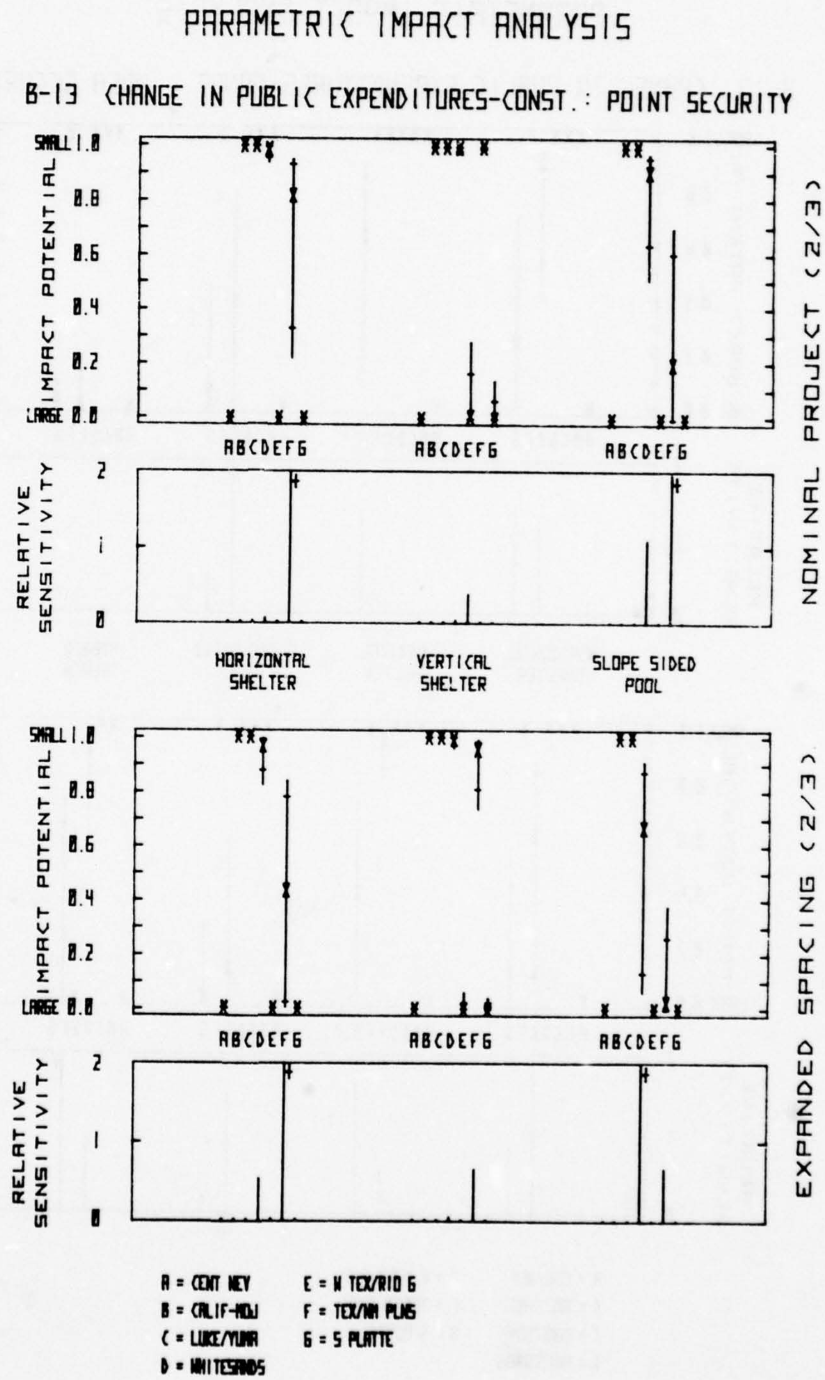

PARAMETRIC IMPACT ANALYSIS
B-13 CHANGE IN PUBLIC EXPENDITURES-CONST.: POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-90

PARAMETRIC IMPACT ANALYSIS

B-13 CHANGE IN PUBLIC EXPENDITURES-CONST.: AREA SECURITY

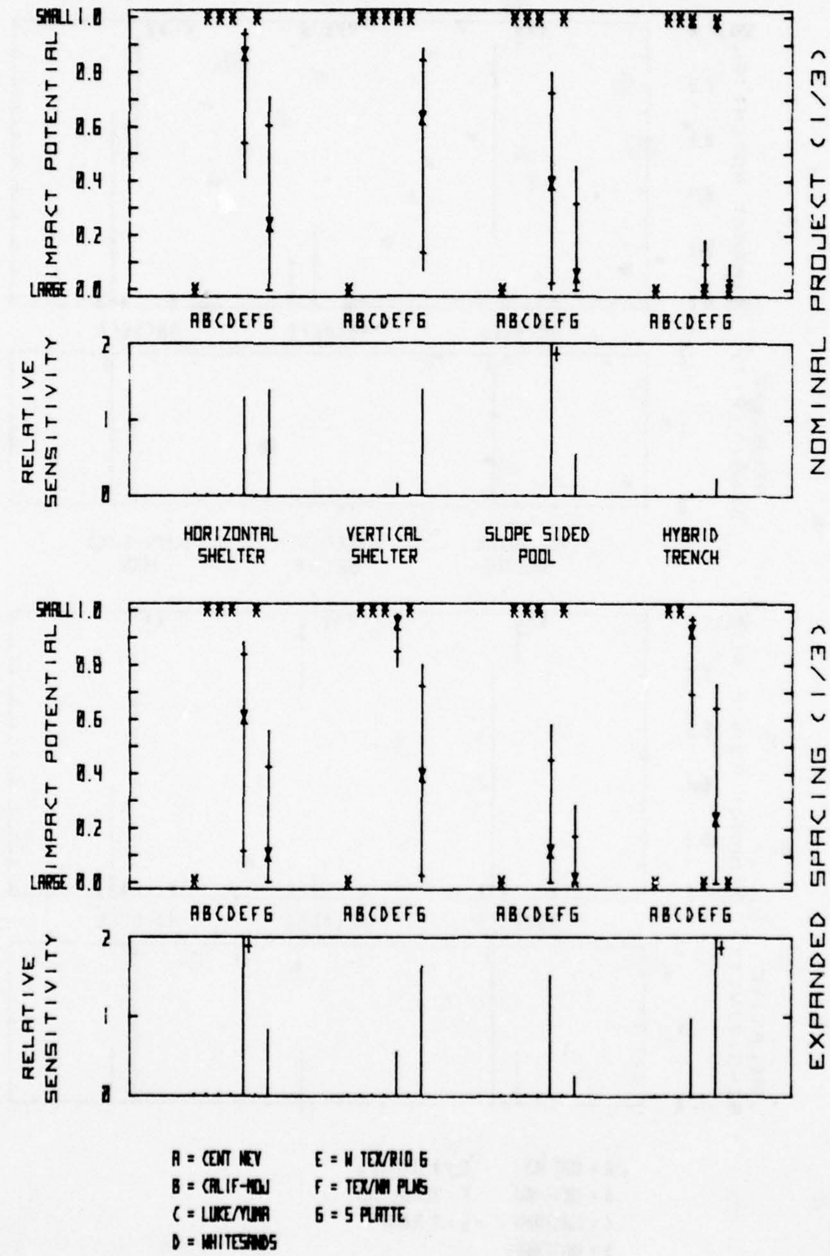


Figure B-91

PARAMETRIC IMPACT ANALYSIS

B-13 CHANGE IN PUBLIC EXPENDITURES-CONST.: POINT SECURITY

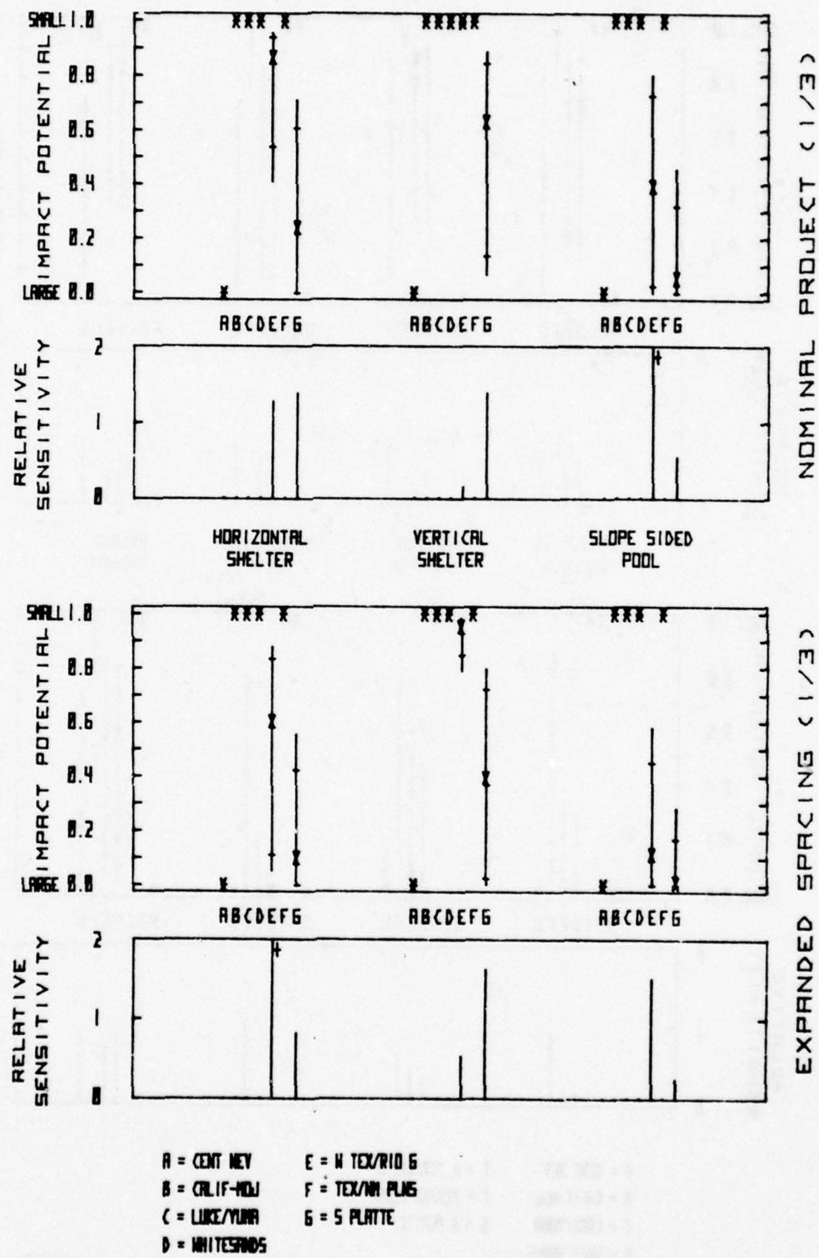


Figure B-92

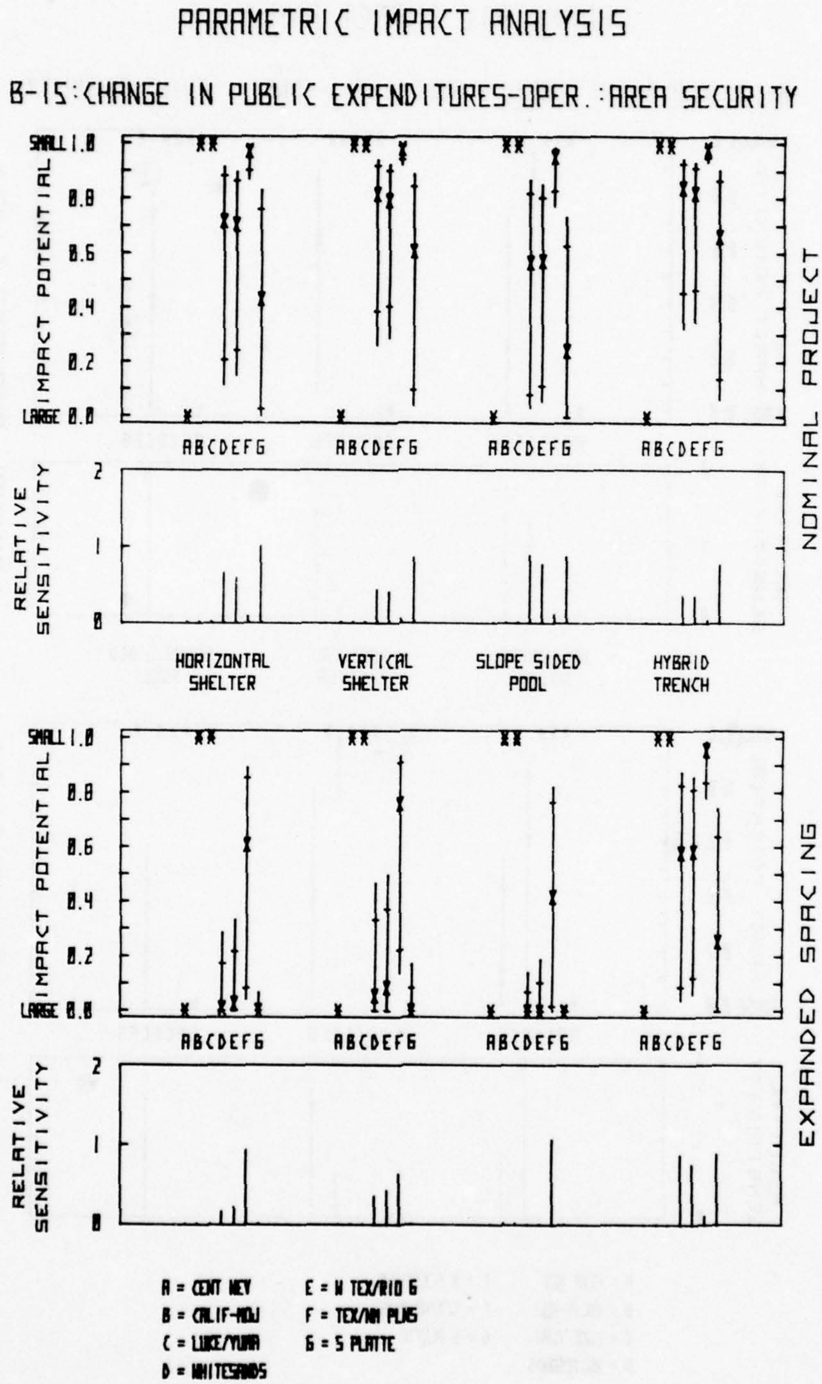
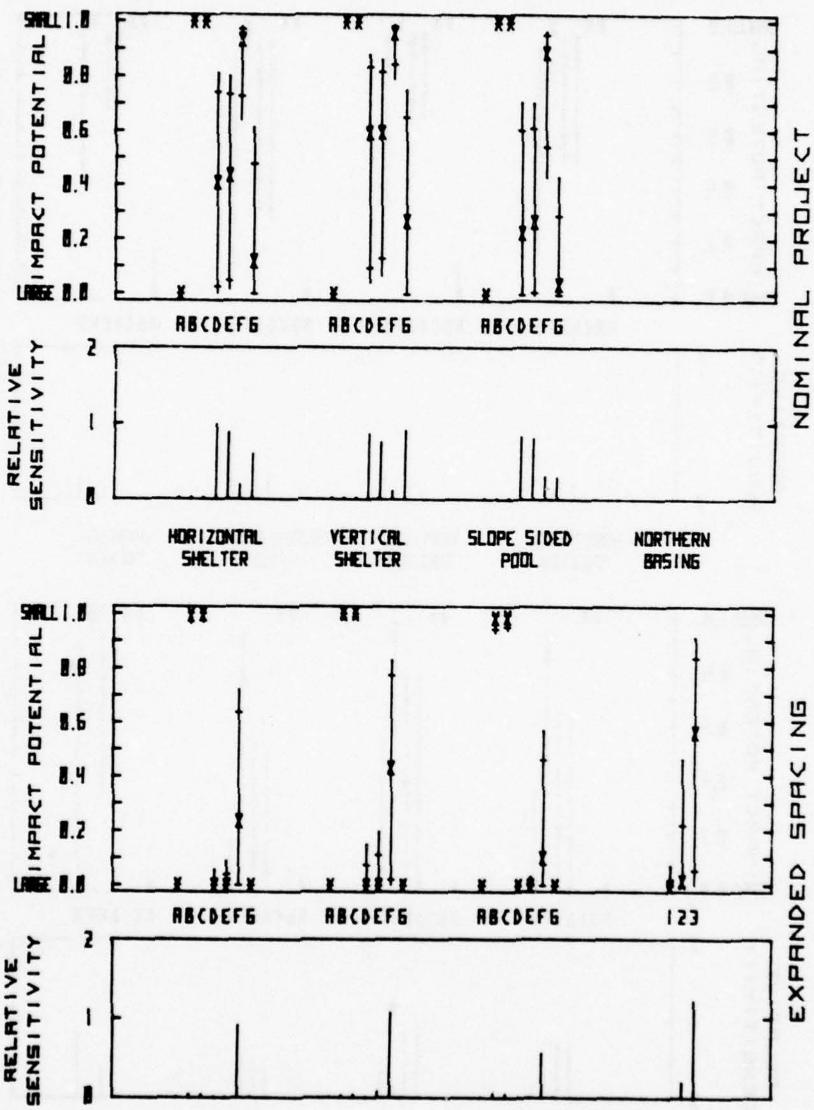

PARAMETRIC IMPACT ANALYSIS
B-15:CHANGE IN PUBLIC EXPENDITURES-OPER.:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-93

PARAMETRIC IMPACT ANALYSIS

B-15: CHANGE IN PUBLIC EXPENDITURES-OPER.: POINT SECURITY



A = CENT NEV
B = CALIF-ARIZ
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-94

PARAMETRIC IMPACT ANALYSIS

B-15 CHANGE IN PUBLIC EXPENDITURES-OPER.: AREA SECURITY

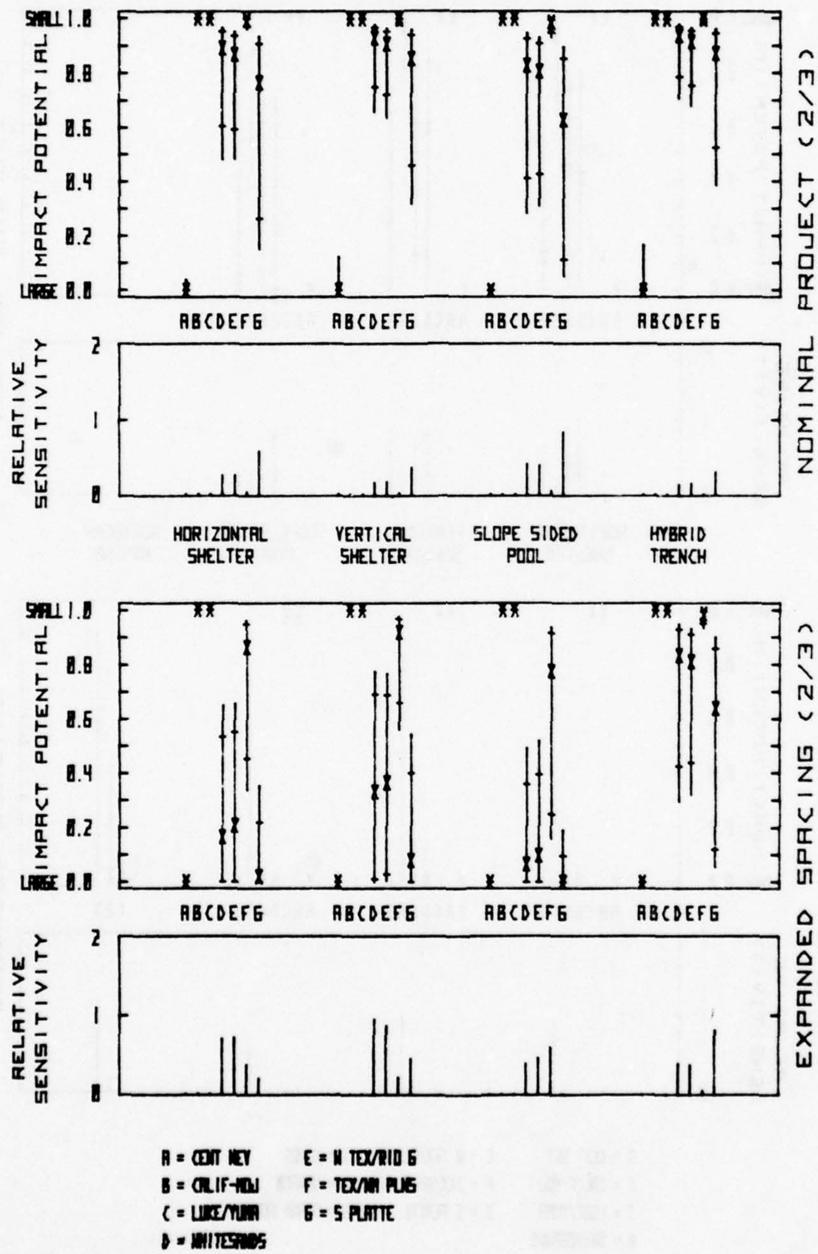


Figure B-95

PARAMETRIC IMPACT ANALYSIS

B-15 CHANGE IN PUBLIC EXPENDITURES-OPER.: POINT SECURITY

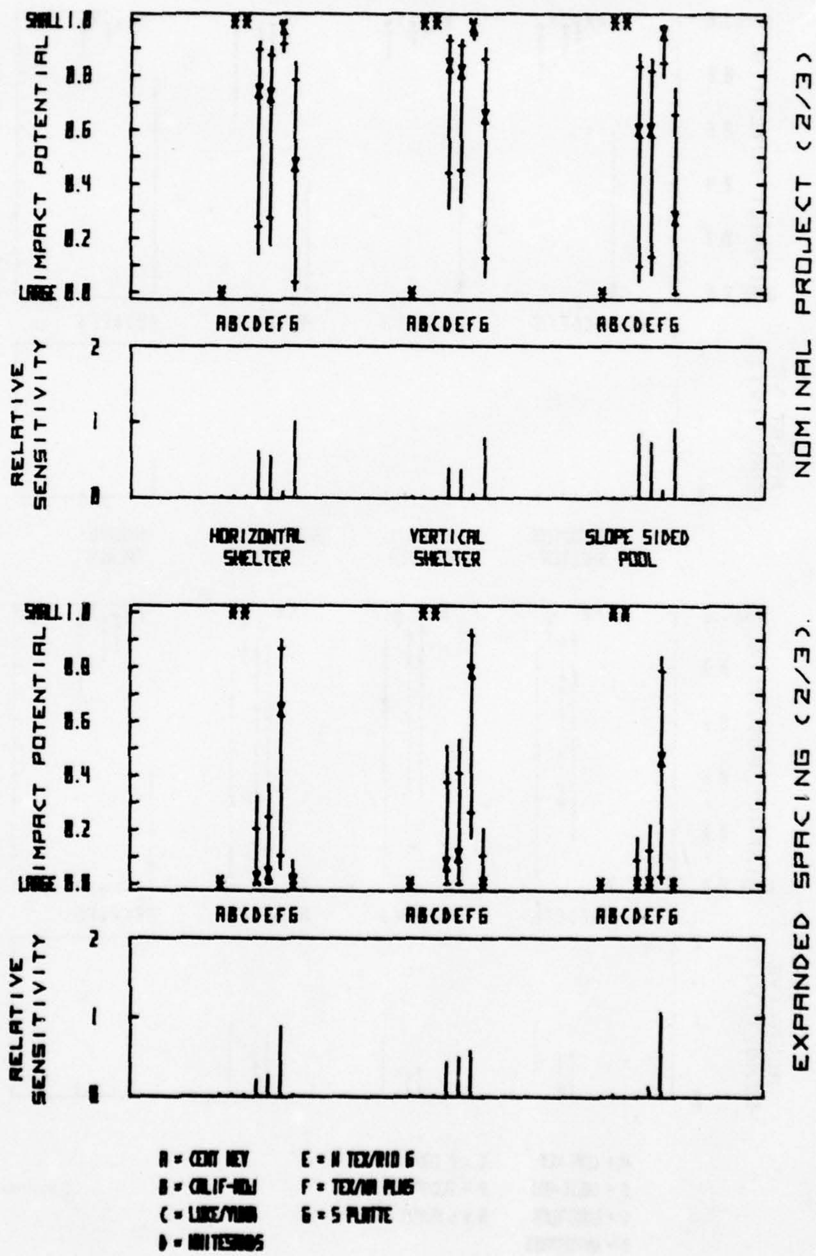


Figure B-96

PARAMETRIC IMPACT ANALYSIS

B-15 CHANGE IN PUBLIC EXPENDITURES-OPER.: AREA SECURITY

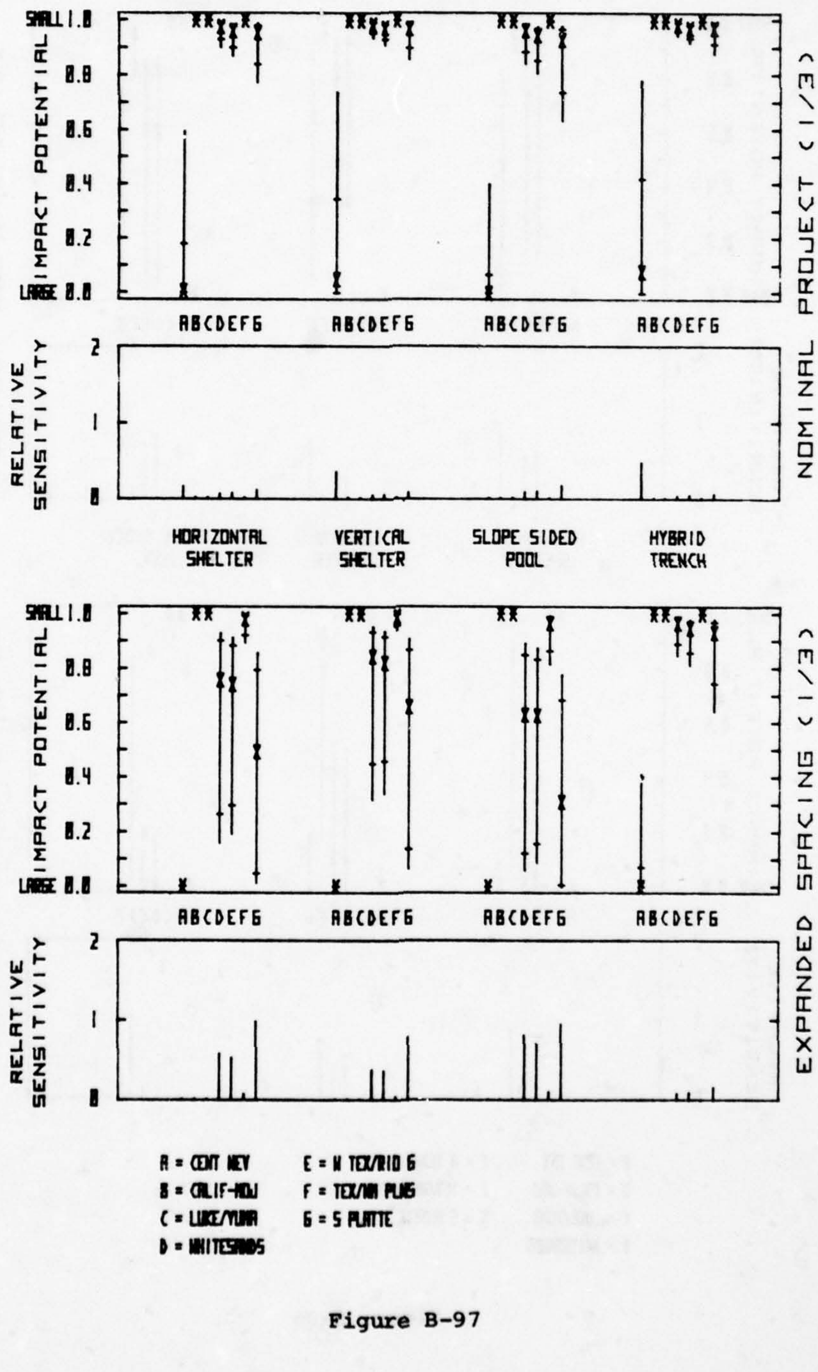


Figure B-97

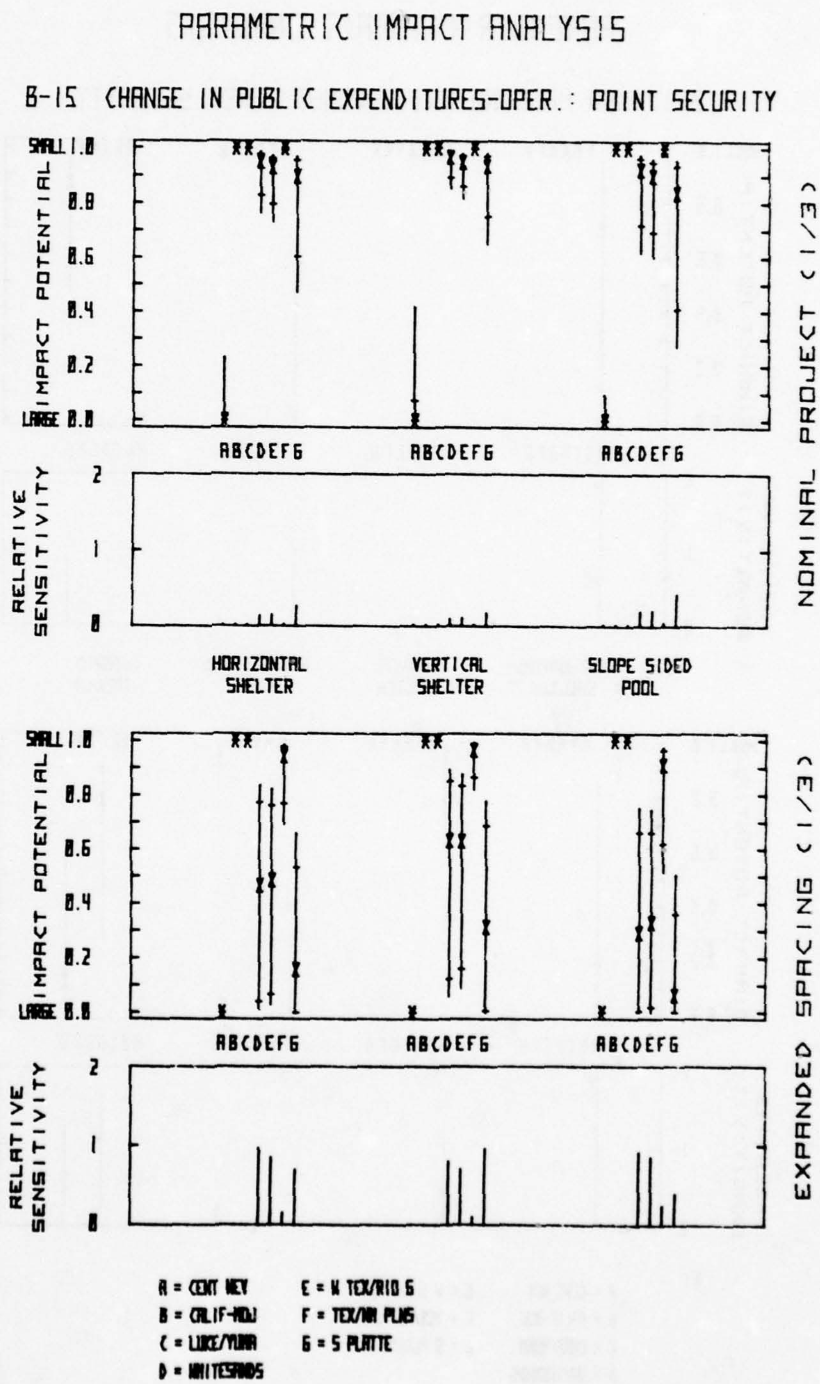

PARAMETRIC IMPACT ANALYSIS
B-15 CHANGE IN PUBLIC EXPENDITURES-OPER.: POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (1/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-98

PARAMETRIC IMPACT ANALYSIS

B-17:NEW HOUSING UNITS-CONST.:AREA SECURITY

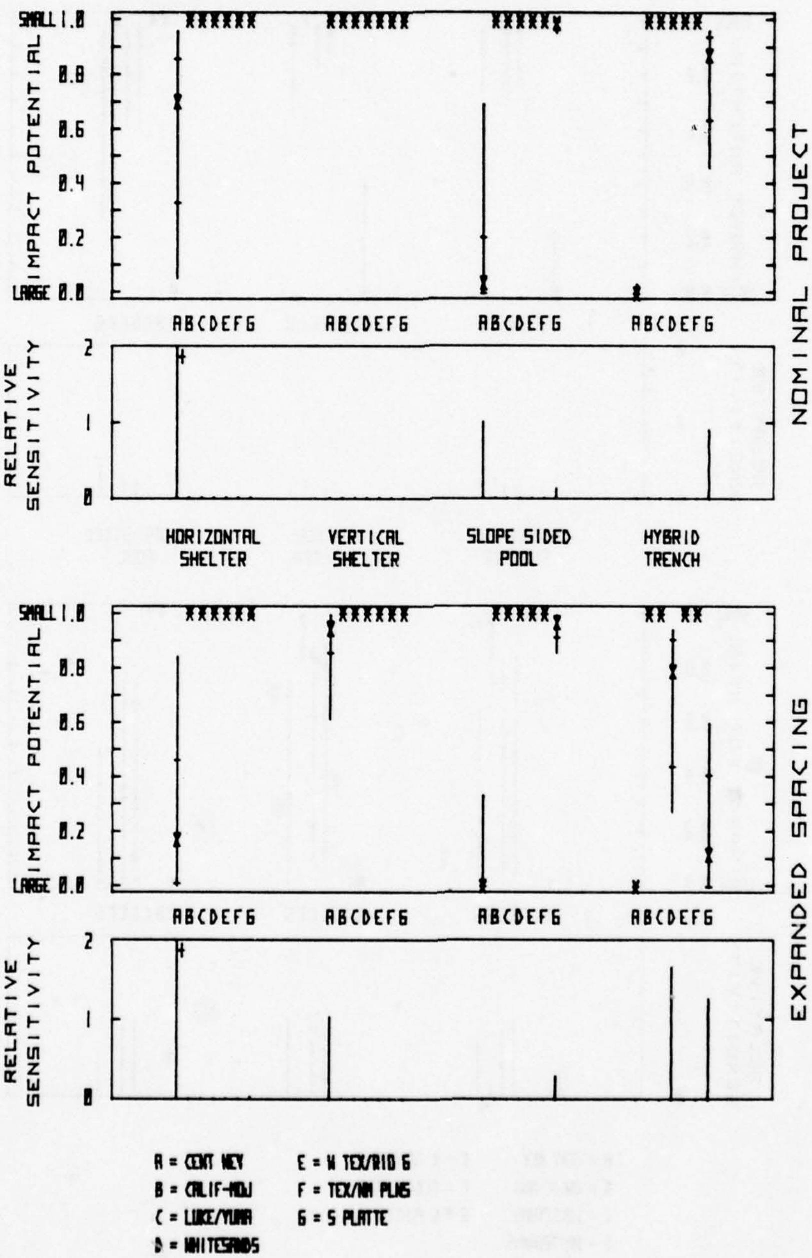


Figure B-99

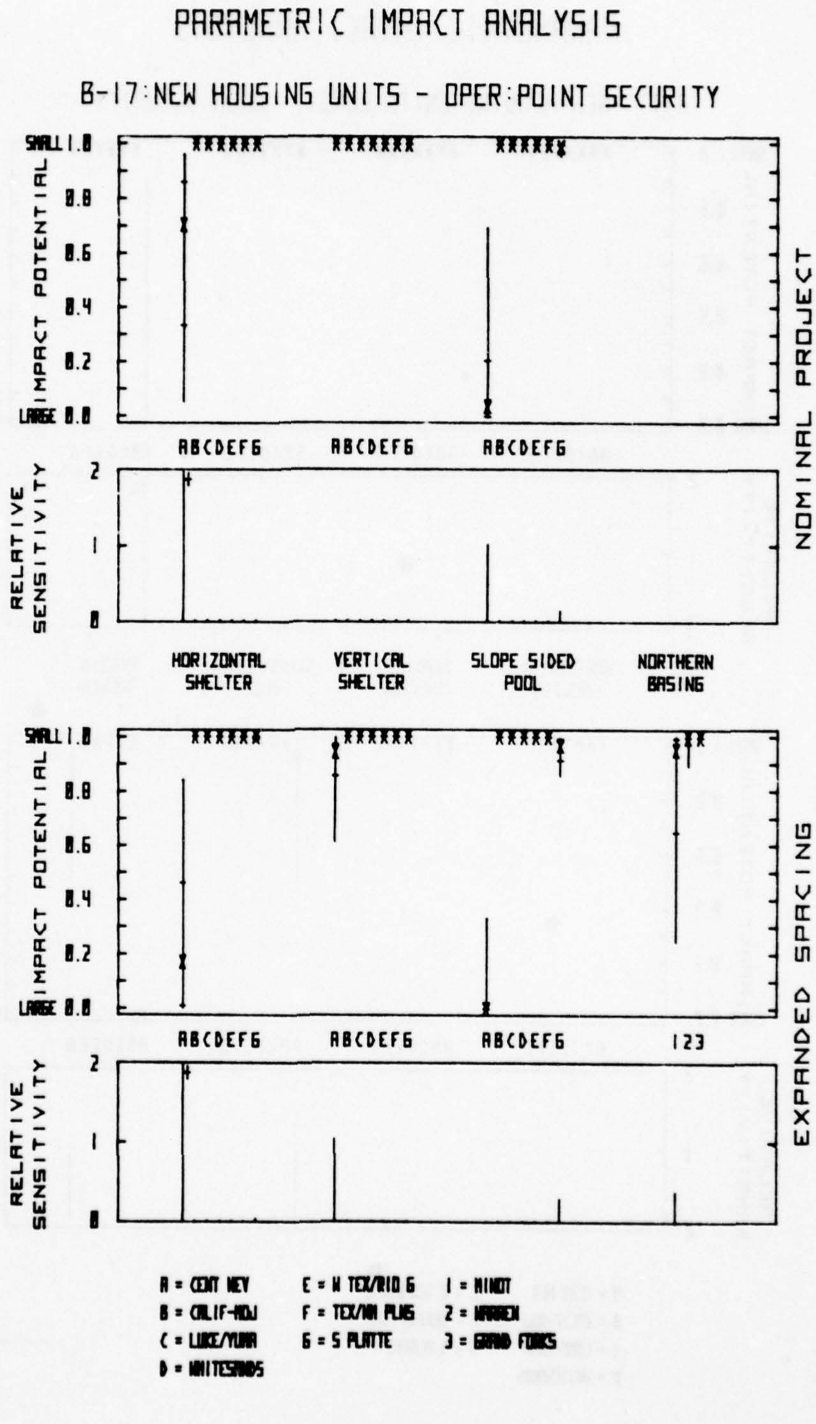

PARAMETRIC IMPACT ANALYSIS
B-17:NEW HOUSING UNITS - OPER:POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-ADJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-100

PARAMETRIC IMPACT ANALYSIS

B-17 NEW HOUSING UNITS-CONST.: AREA SECURITY

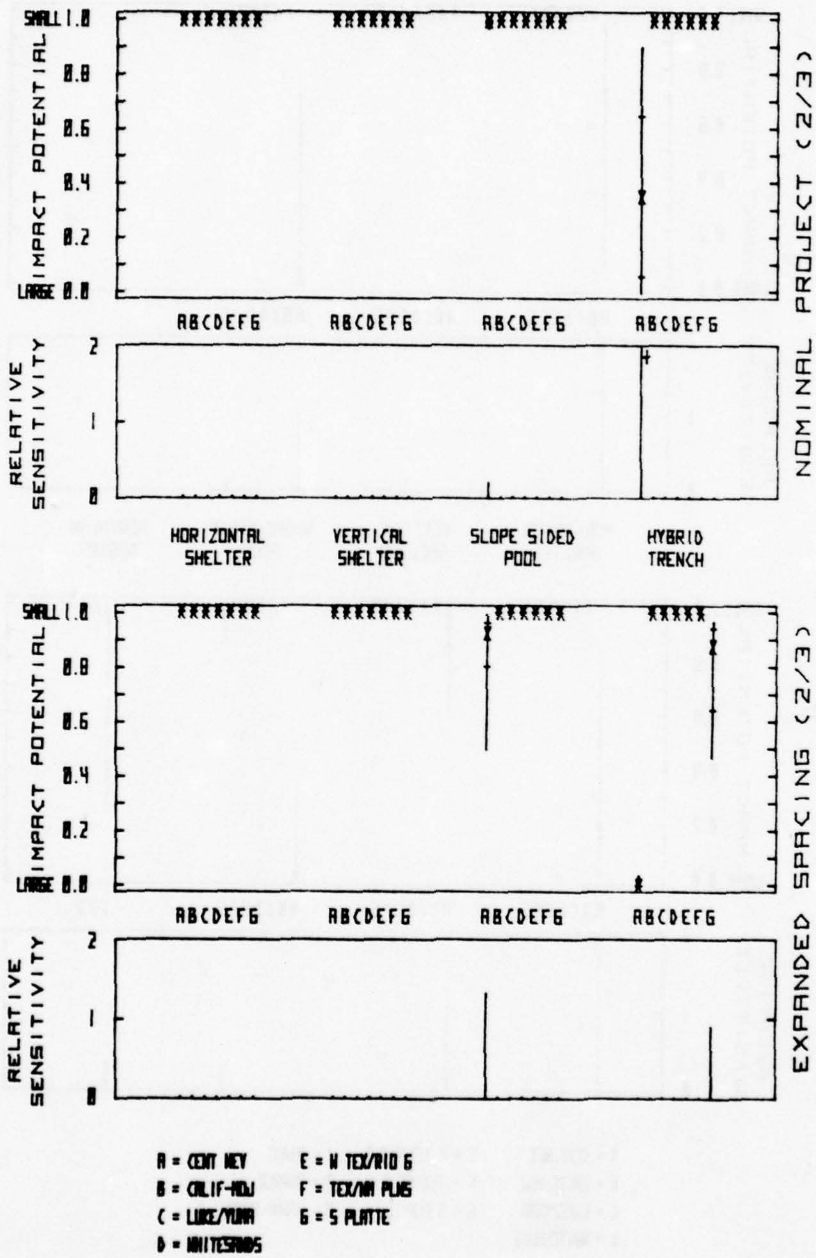


Figure B-101

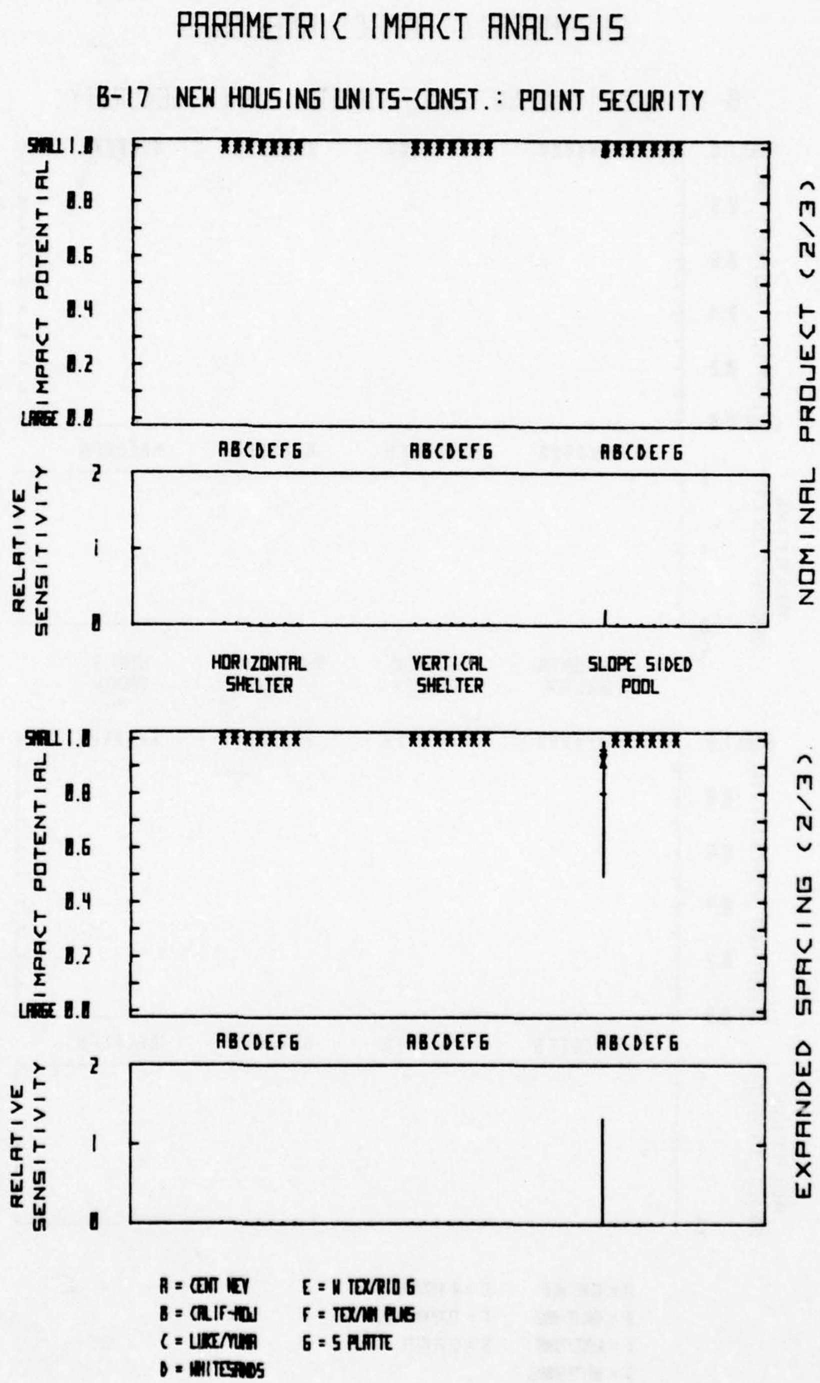

PARAMETRIC IMPACT ANALYSIS
B-17 NEW HOUSING UNITS-CONST.: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-102

PARAMETRIC IMPACT ANALYSIS

B-17 NEW HOUSING UNITS-CONSTR.: AREA SECURITY

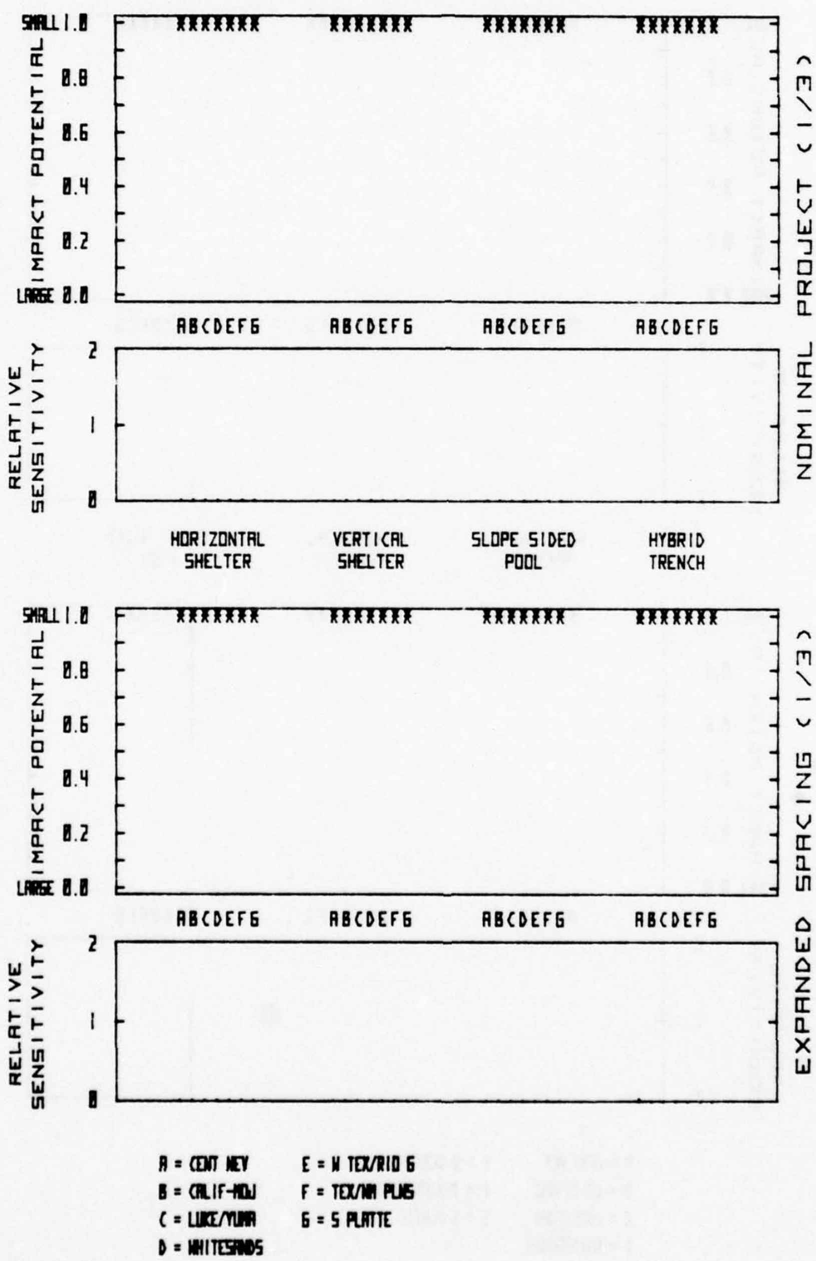


Figure B-103

PARAMETRIC IMPACT ANALYSIS

B-17 NEW HOUSING UNIT-CONST: POINT SECURITY

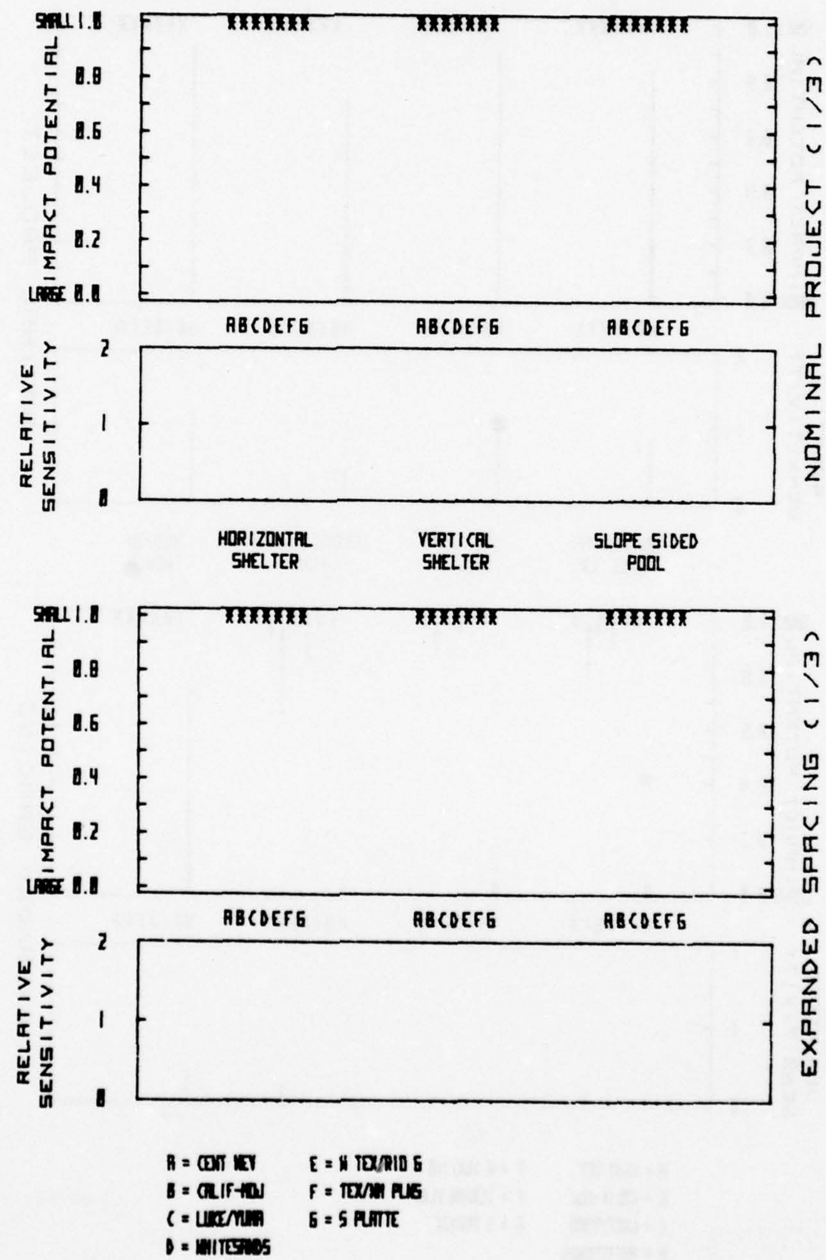


Figure B-104

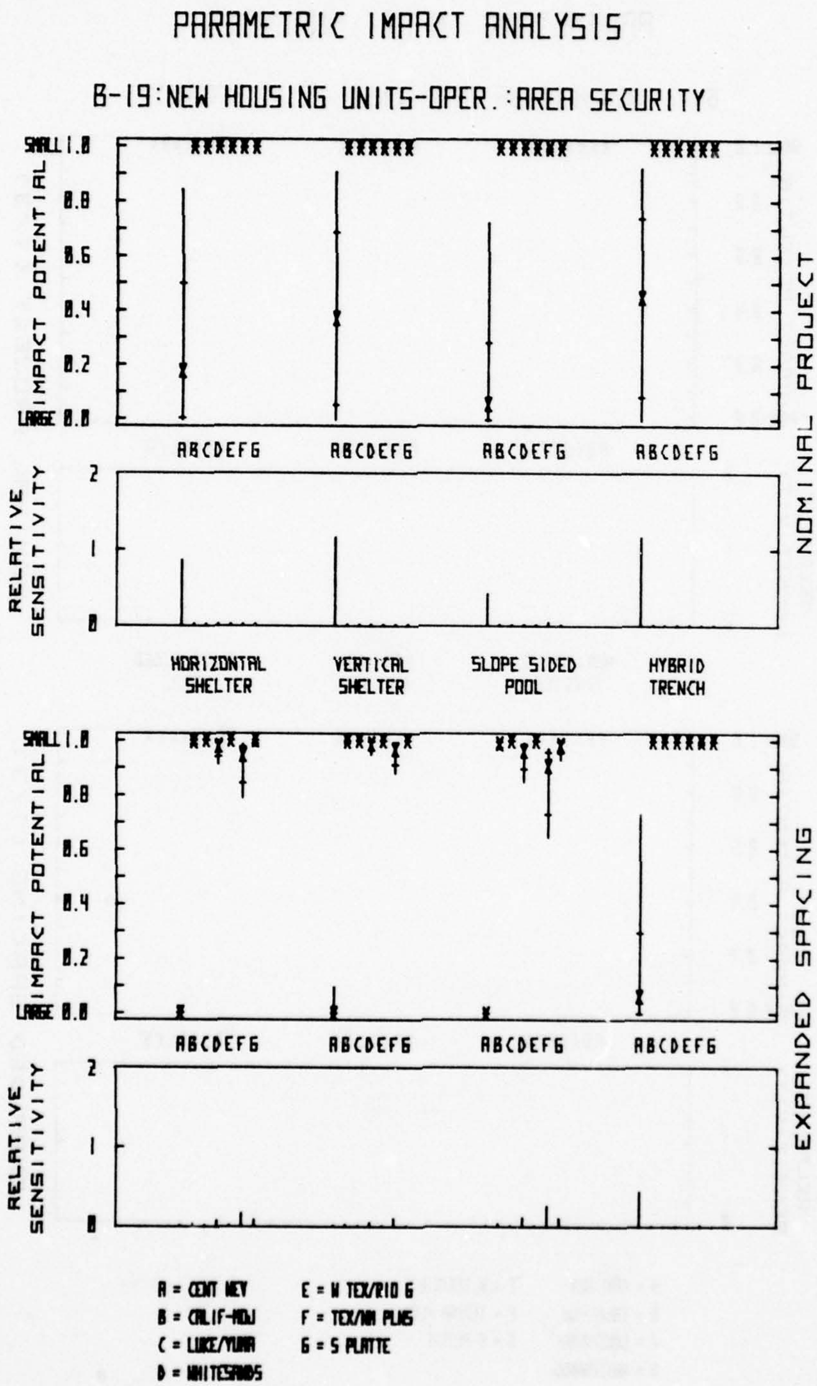

PARAMETRIC IMPACT ANALYSIS
B-19:NEW HOUSING UNITS-OPER.:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-105

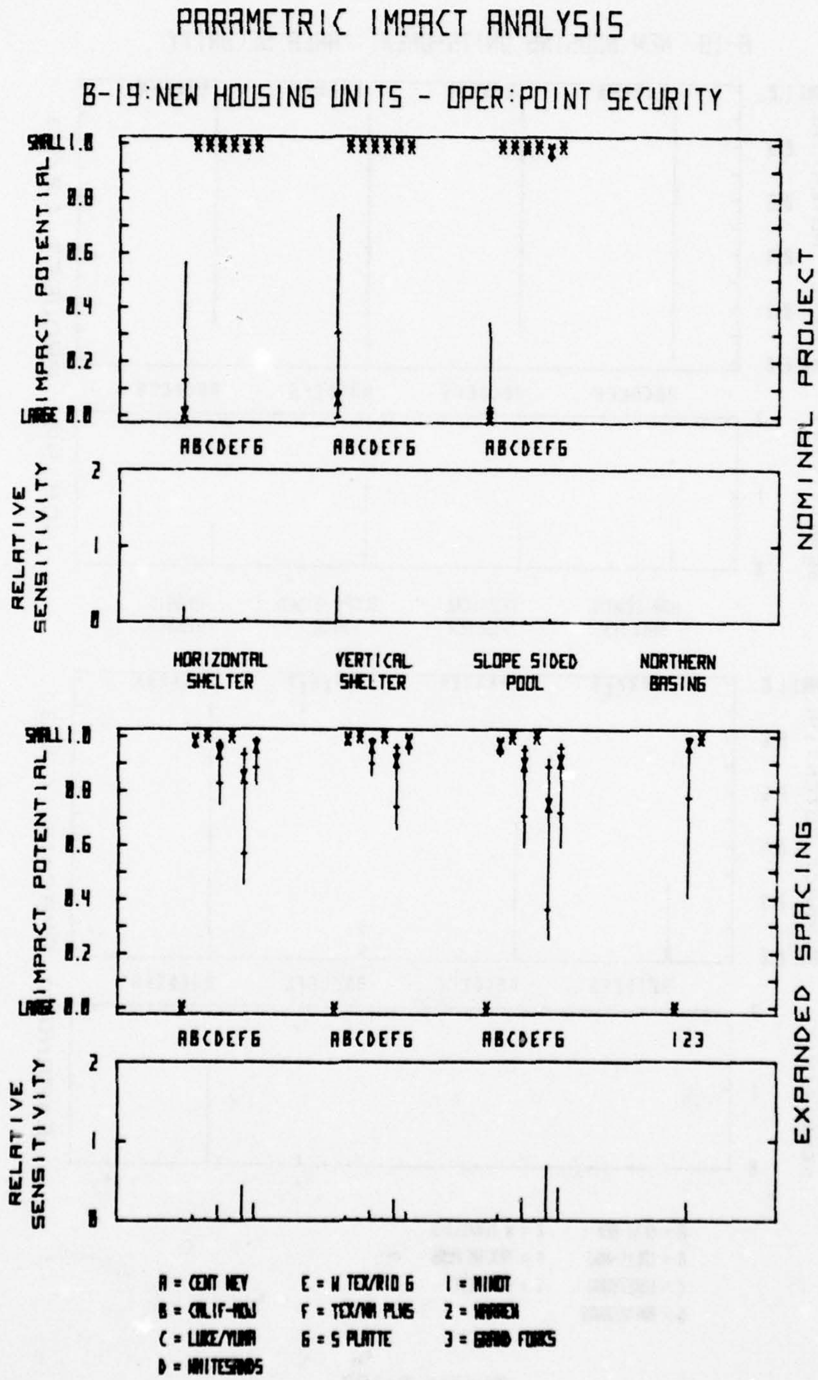

PARAMETRIC IMPACT ANALYSIS
B-19:NEW HOUSING UNITS - OPER:POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-106

PARAMETRIC IMPACT ANALYSIS

B-19 NEW HOUSING UNITS-OPER.: AREA SECURITY

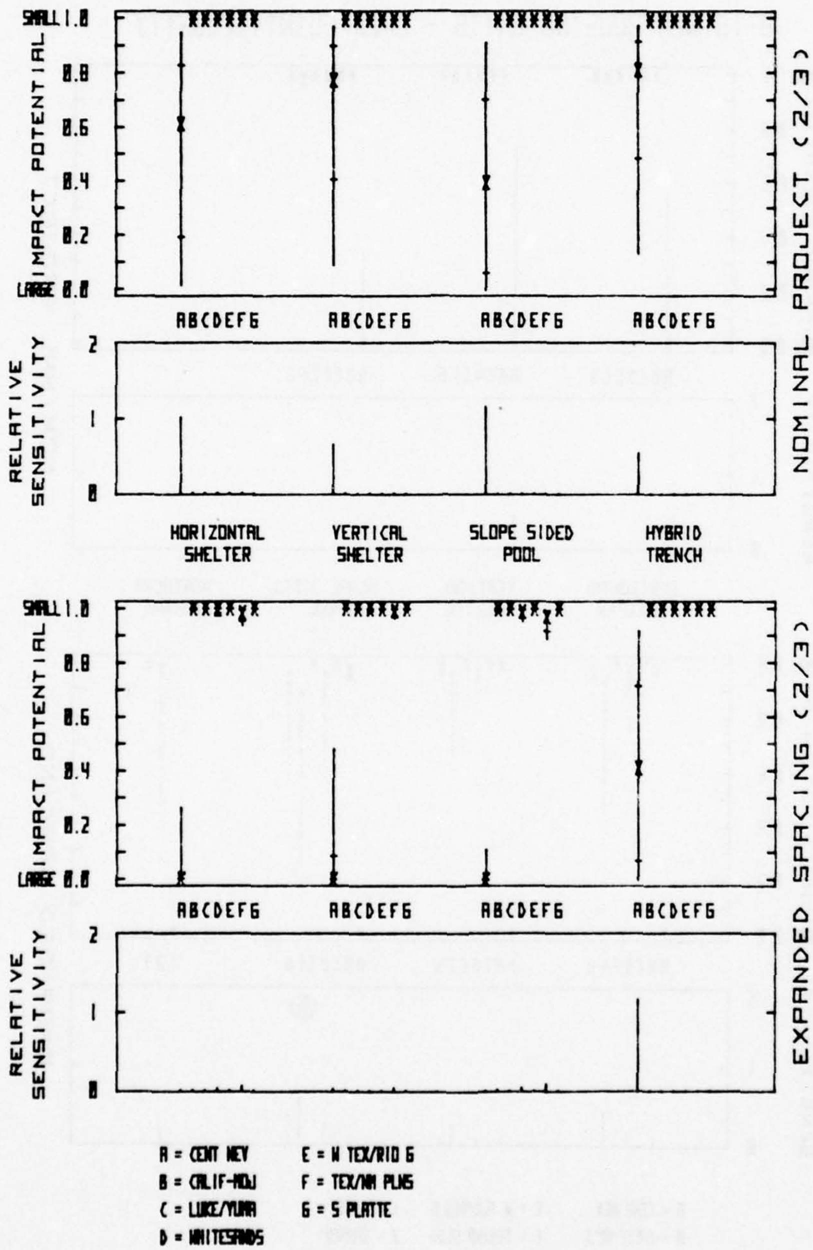


Figure B-107

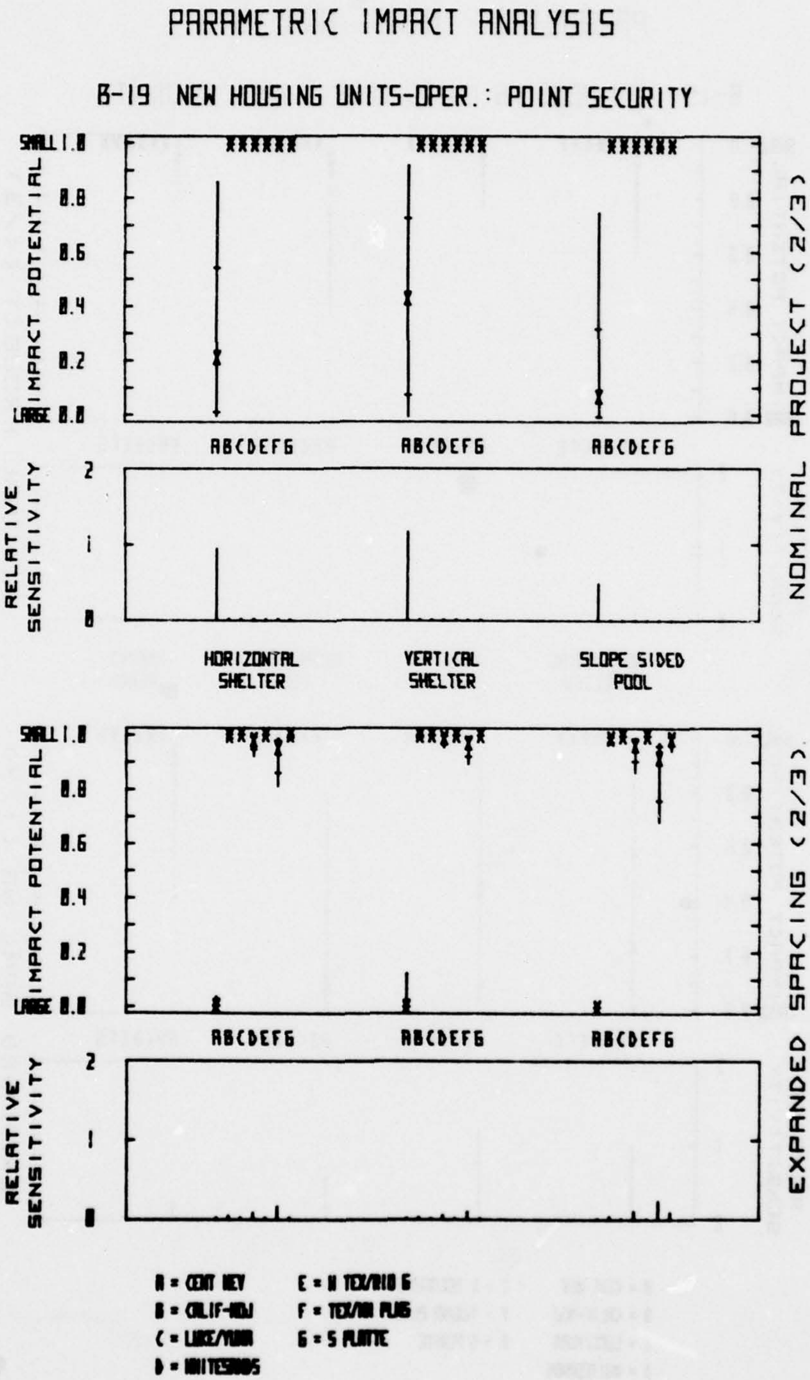

PARAMETRIC IMPACT ANALYSIS
B-19 NEW HOUSING UNITS-OPER.: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LAKE/YUMA
D = WHITESANDS
E = N TEX/NM G
F = TEX/NM PLNS
G = S PLATTE

Figure B-108

PARAMETRIC IMPACT ANALYSIS

B-19 NEW HOUSING UNITS-OPER.: AREA SECURITY

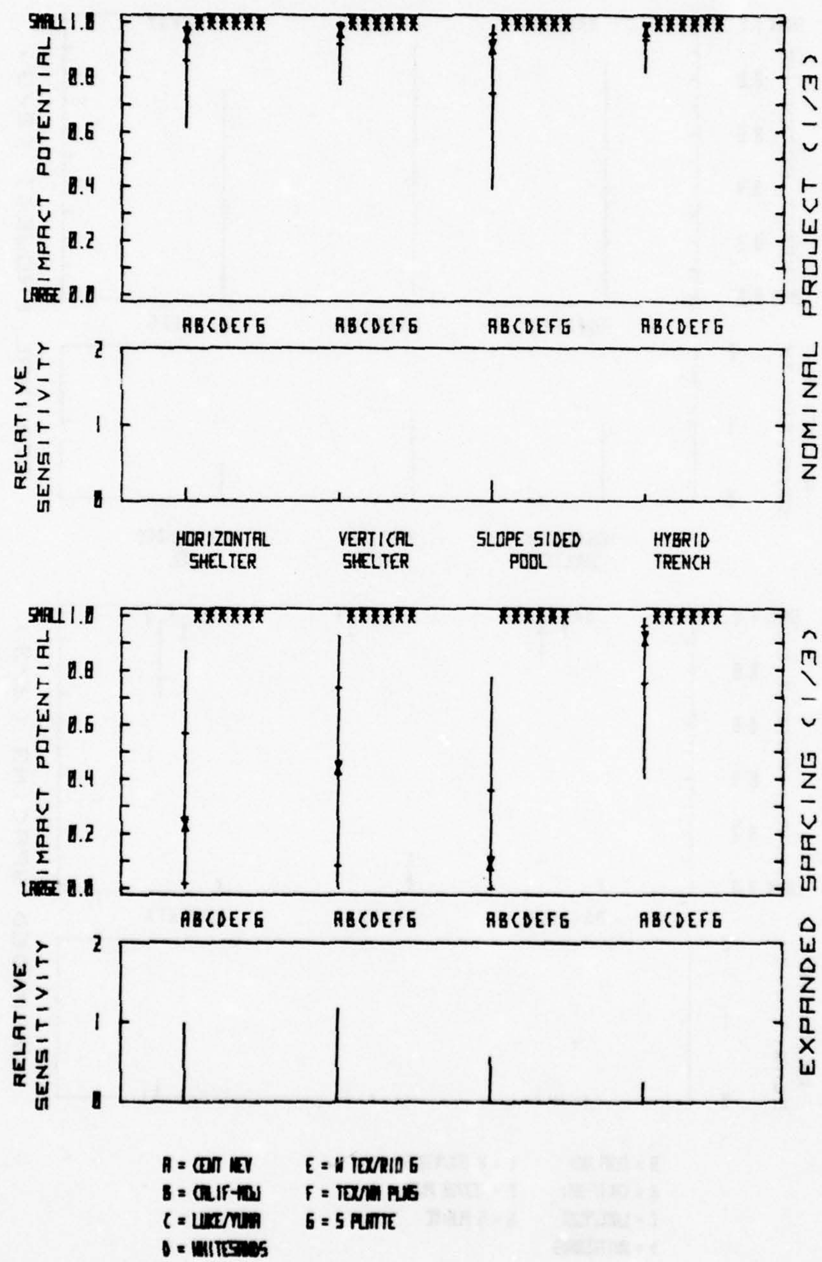
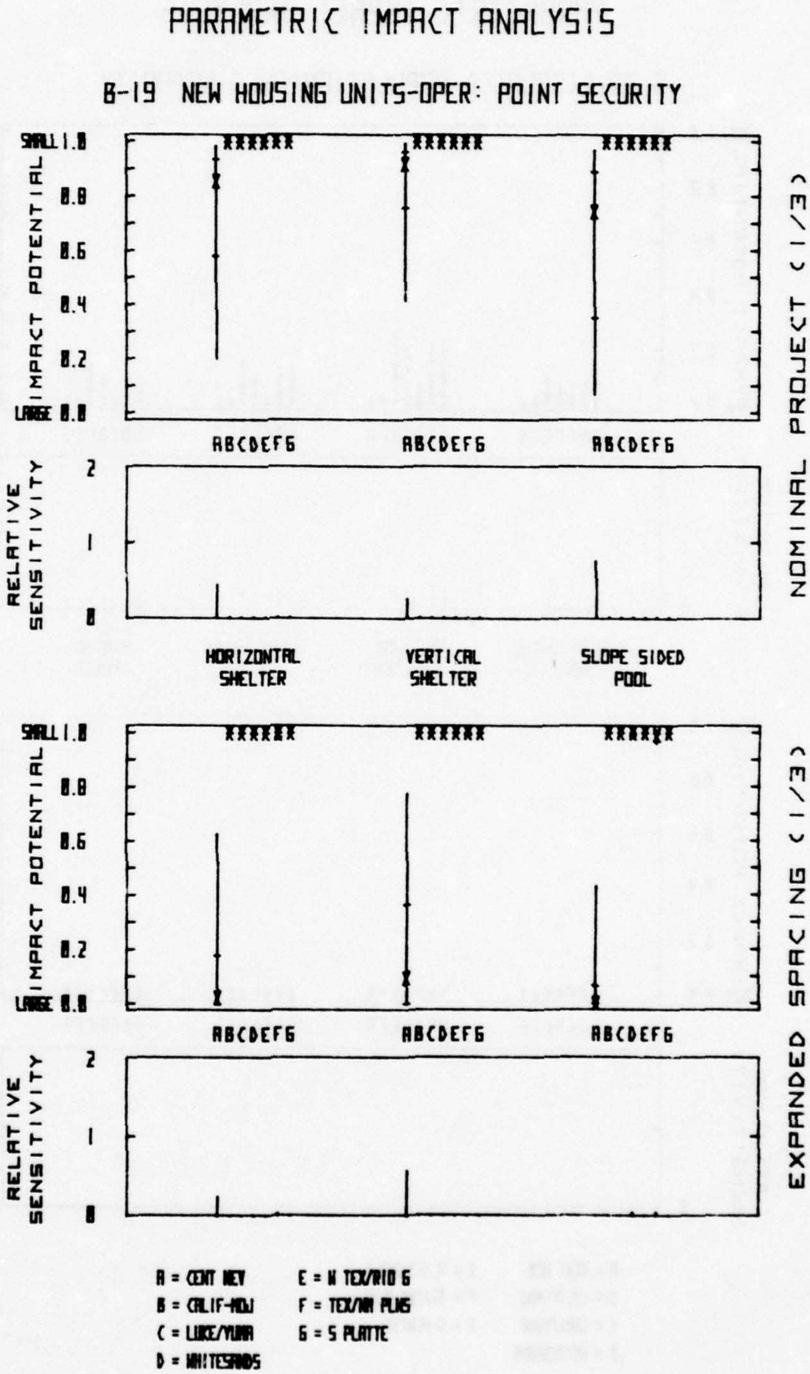


Figure B-109



PARAMETRIC IMPACT ANALYSIS
B-19 NEW HOUSING UNITS-OPER: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-110

PARAMETRIC IMPACT ANALYSIS

B-22: DISPLACED POPULATION: AREA SECURITY

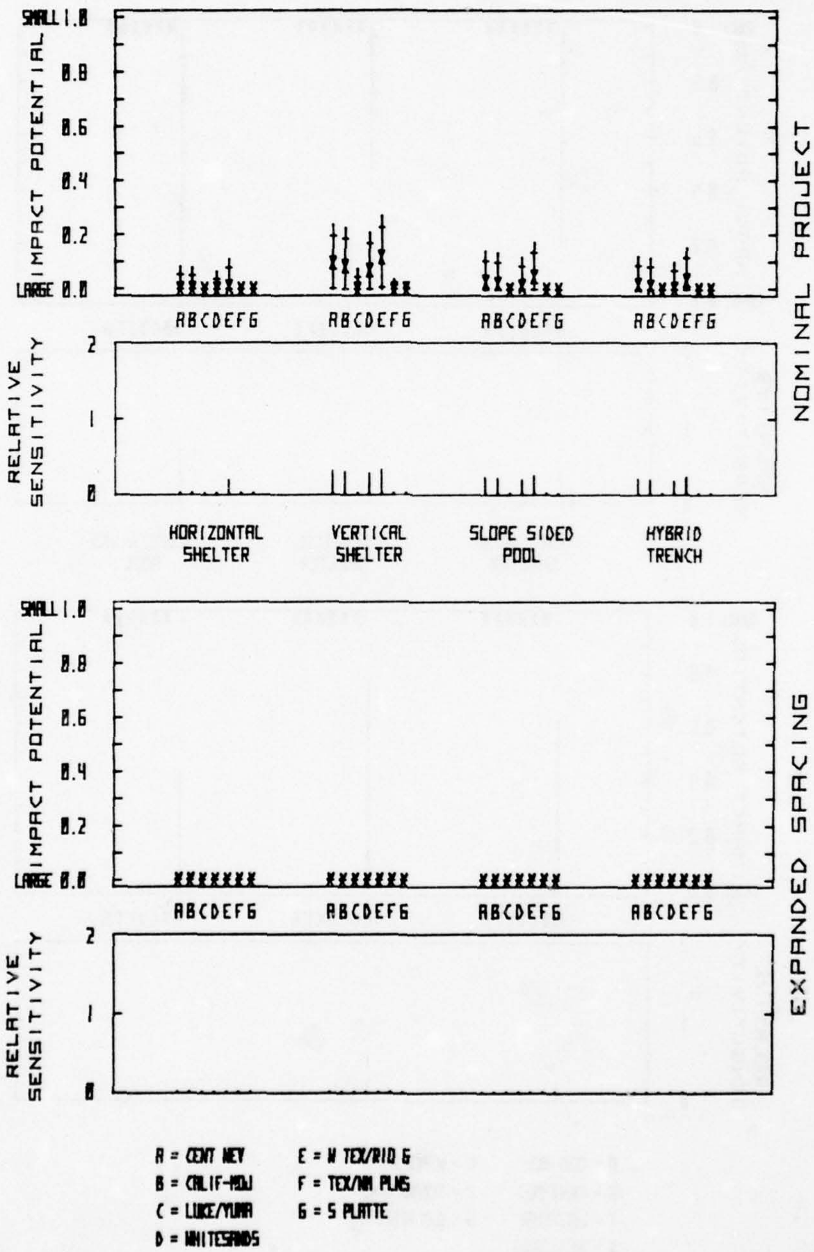


Figure B-111

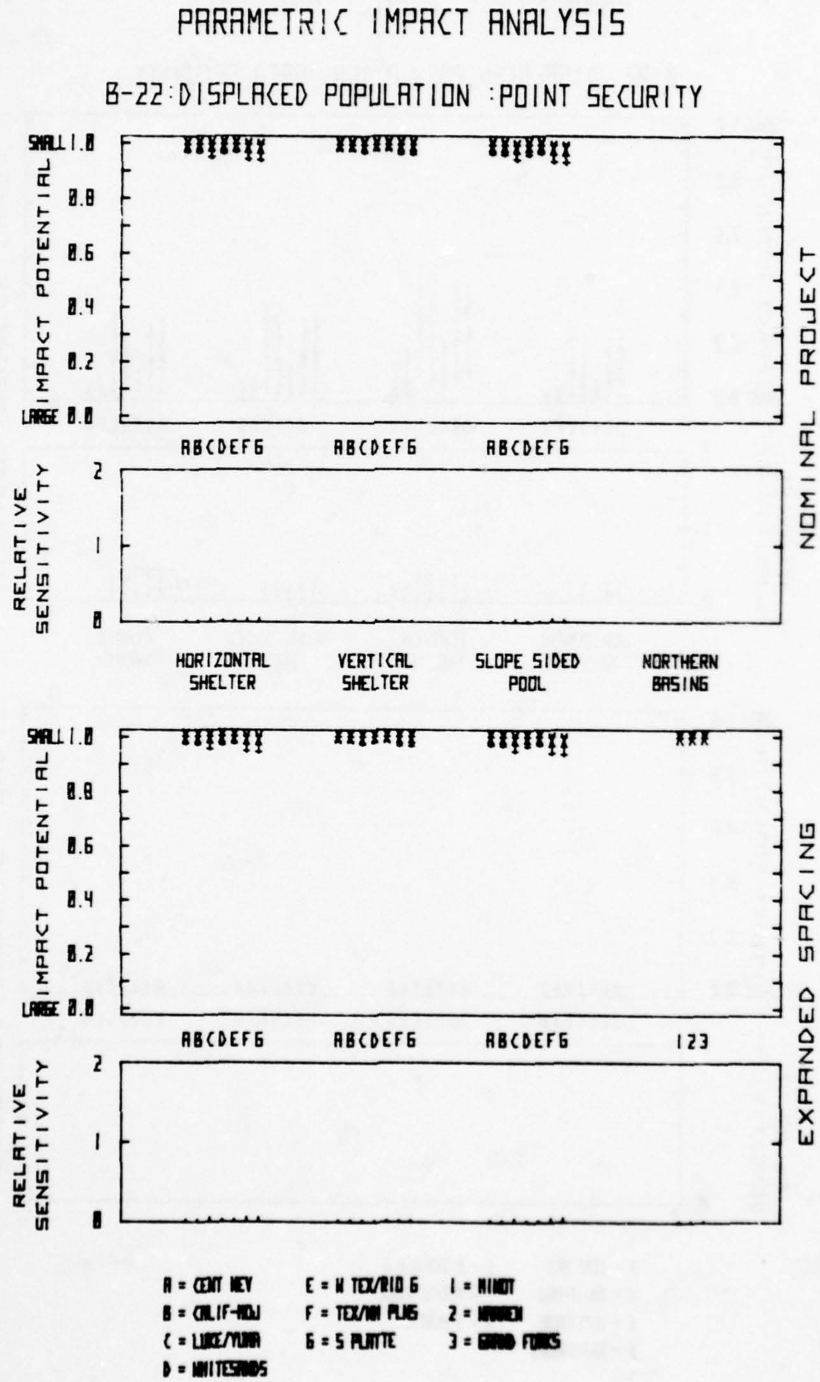

PARAMETRIC IMPACT ANALYSIS
B-22: DISPLACED POPULATION : POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
G = S PLATTE
1 = MINOT
3 = GRAND FORKS

Figure B-112

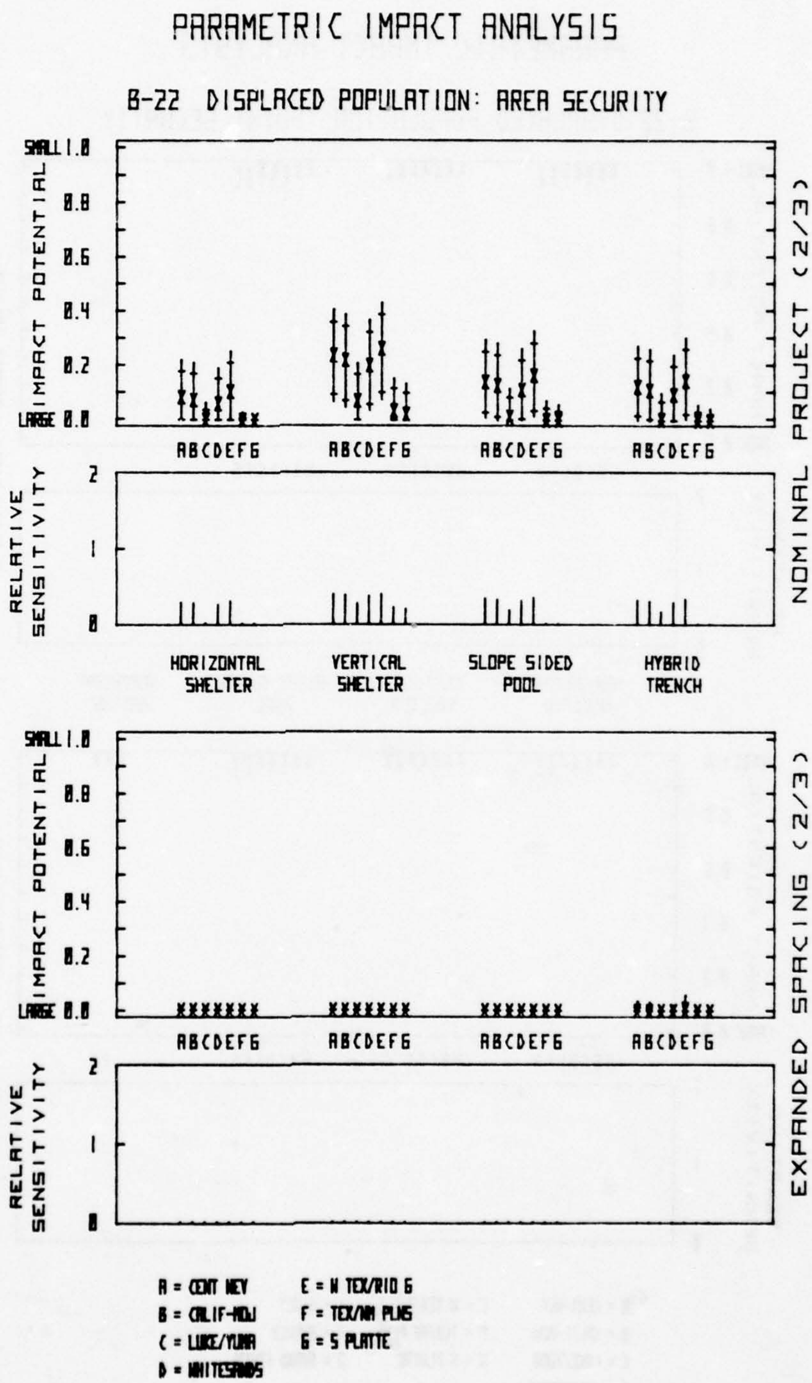

PARAMETRIC IMPACT ANALYSIS
B-22 DISPLACED POPULATION: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (2/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-113

PARAMETRIC IMPACT ANALYSIS

B-22 DISPLACED POPULATION: POINT SECURITY

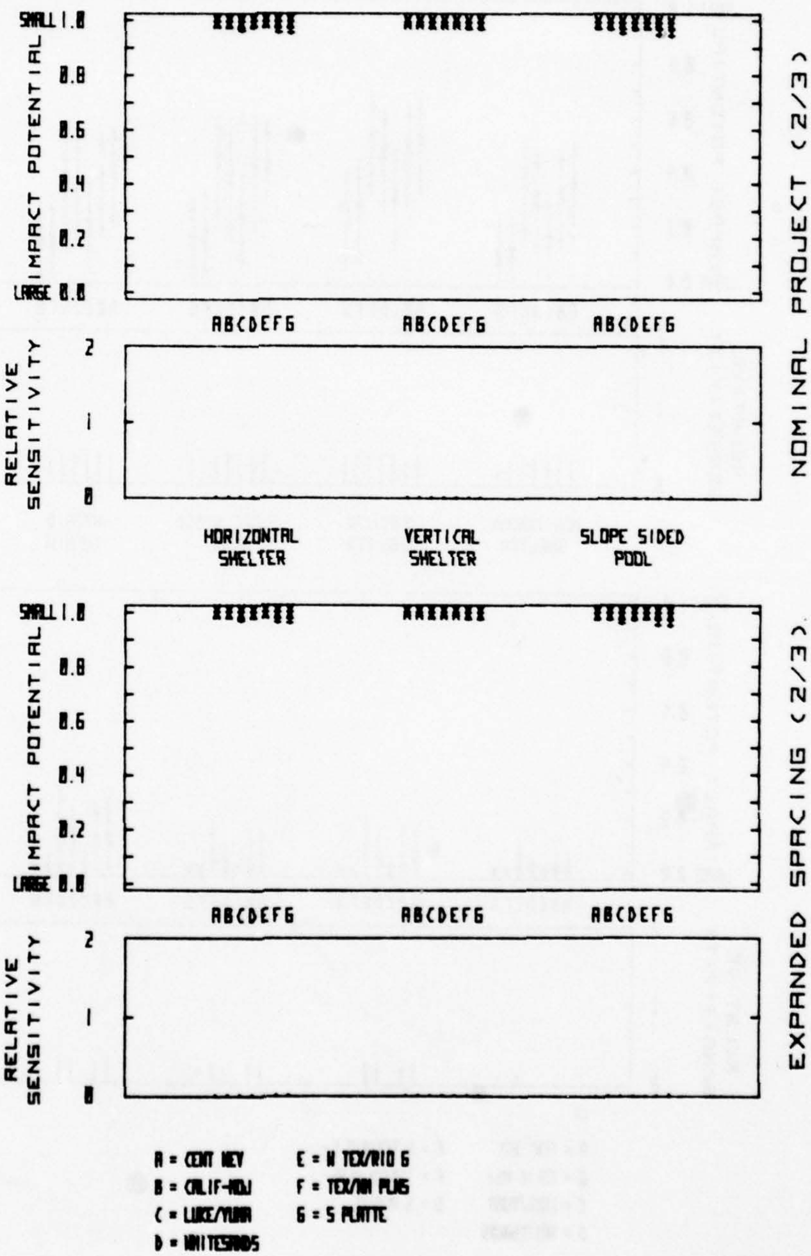
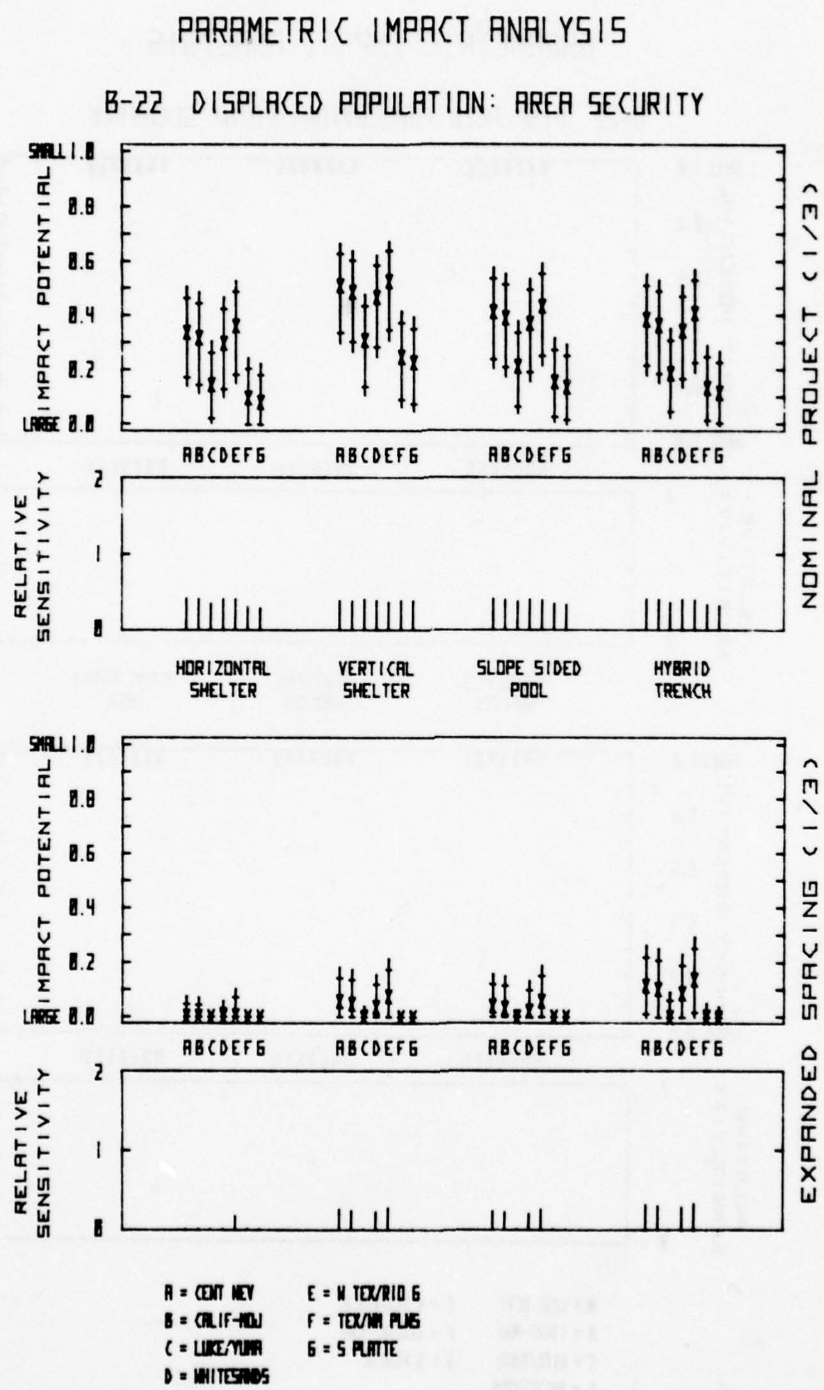


Figure B-114



PARAMETRIC IMPACT ANALYSIS
B-22 DISPLACED POPULATION: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-115

PARAMETRIC IMPACT ANALYSIS

B-22 DISPLACED POPULATION: POINT SECURITY

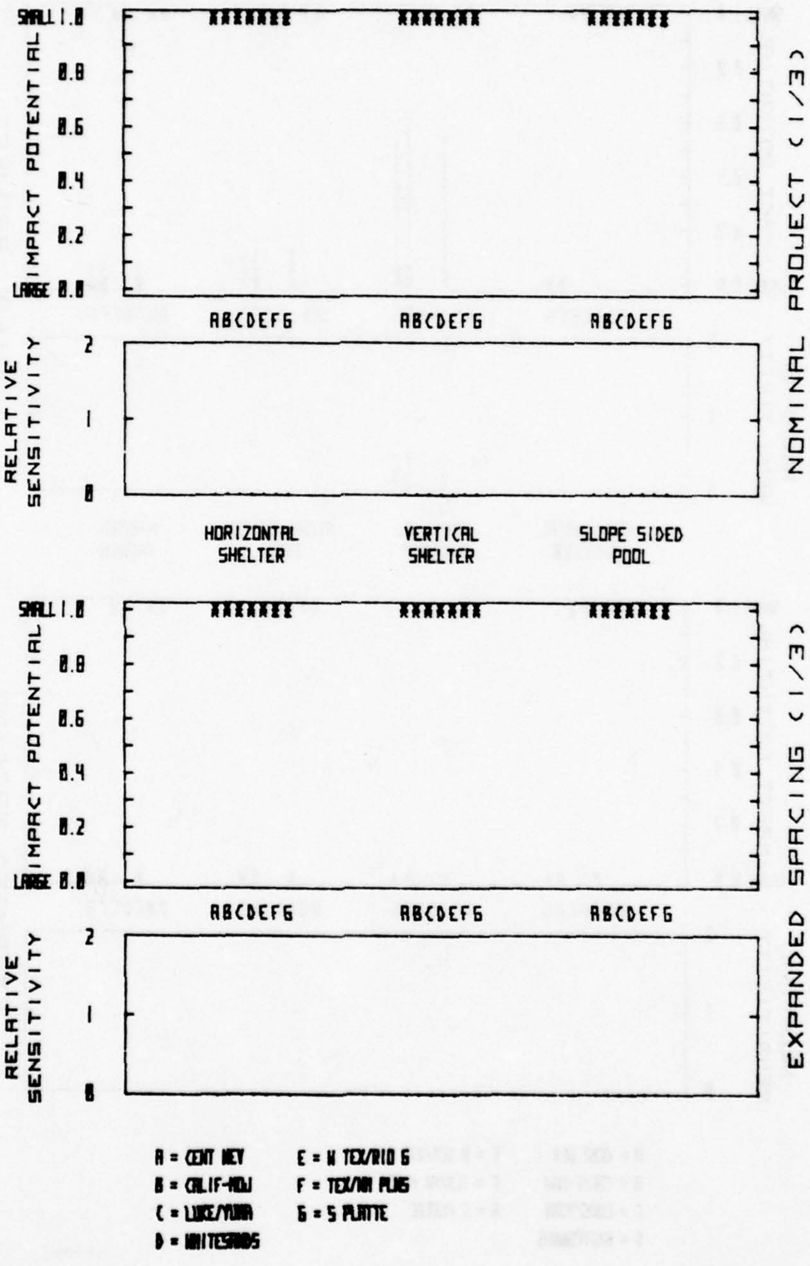
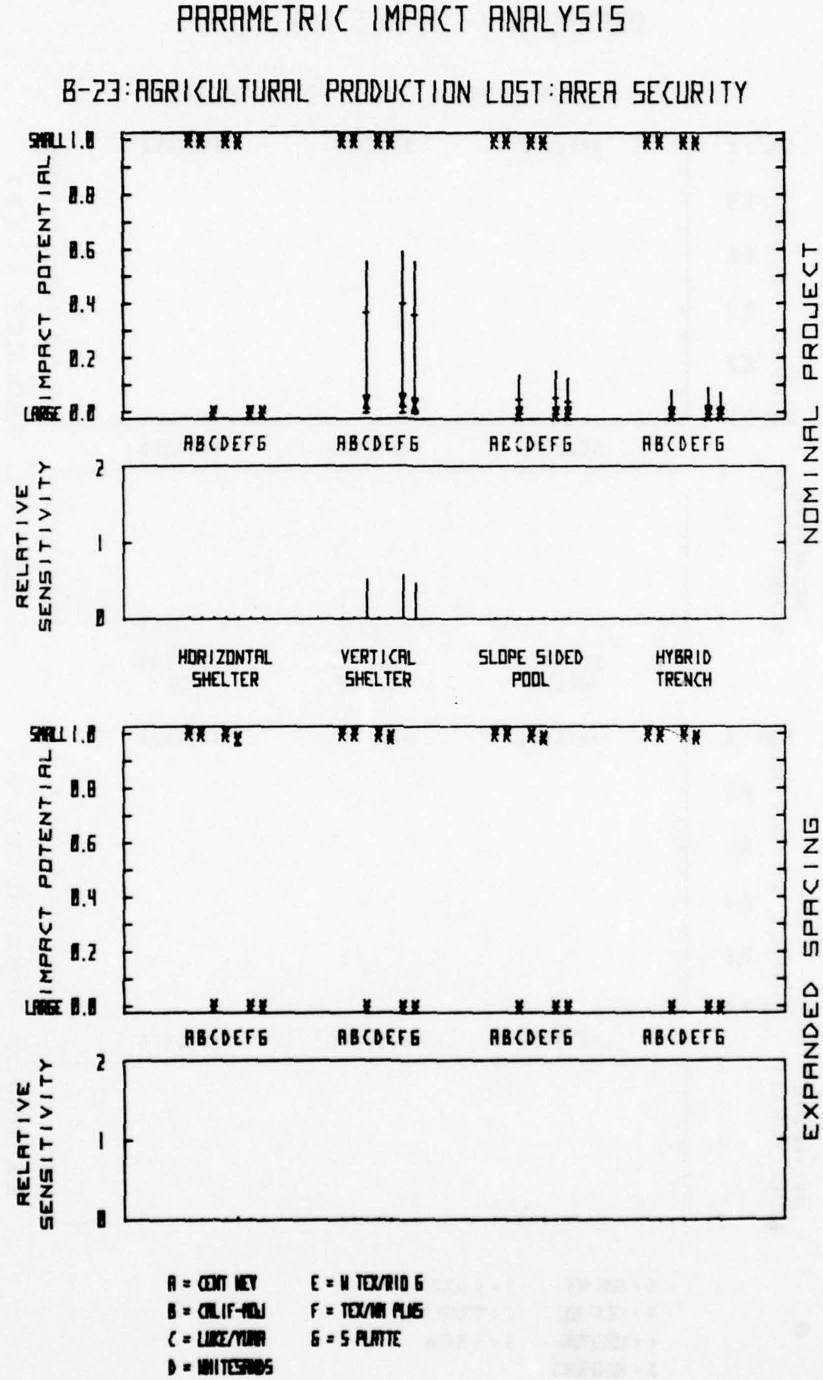


Figure B-116



PARAMETRIC IMPACT ANALYSIS
B-23:AGRICULTURAL PRODUCTION LOST:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-117

PARAMETRIC IMPACT ANALYSIS

B-23: AGRICULTURAL PRODUCTION LOST :POINT SECURITY

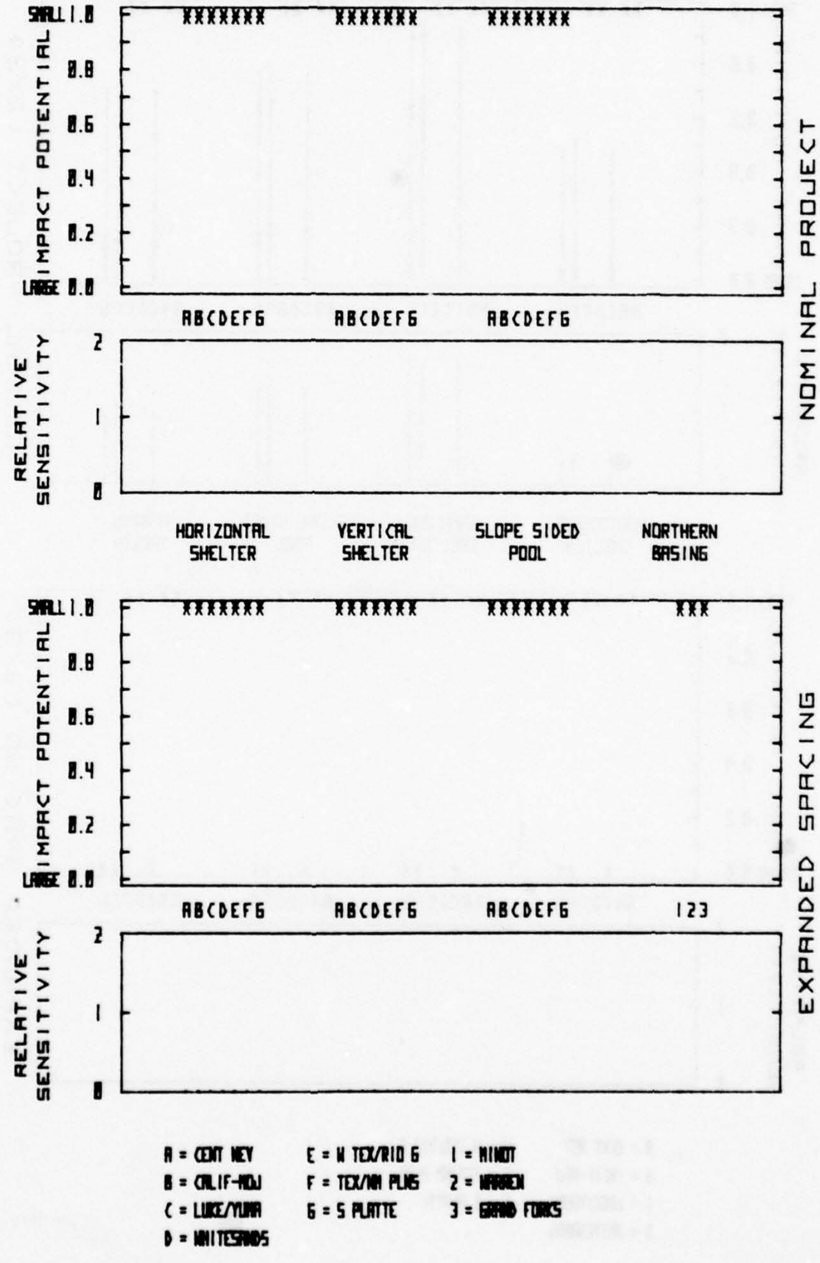


Figure B-118

PARAMETRIC IMPACT ANALYSIS

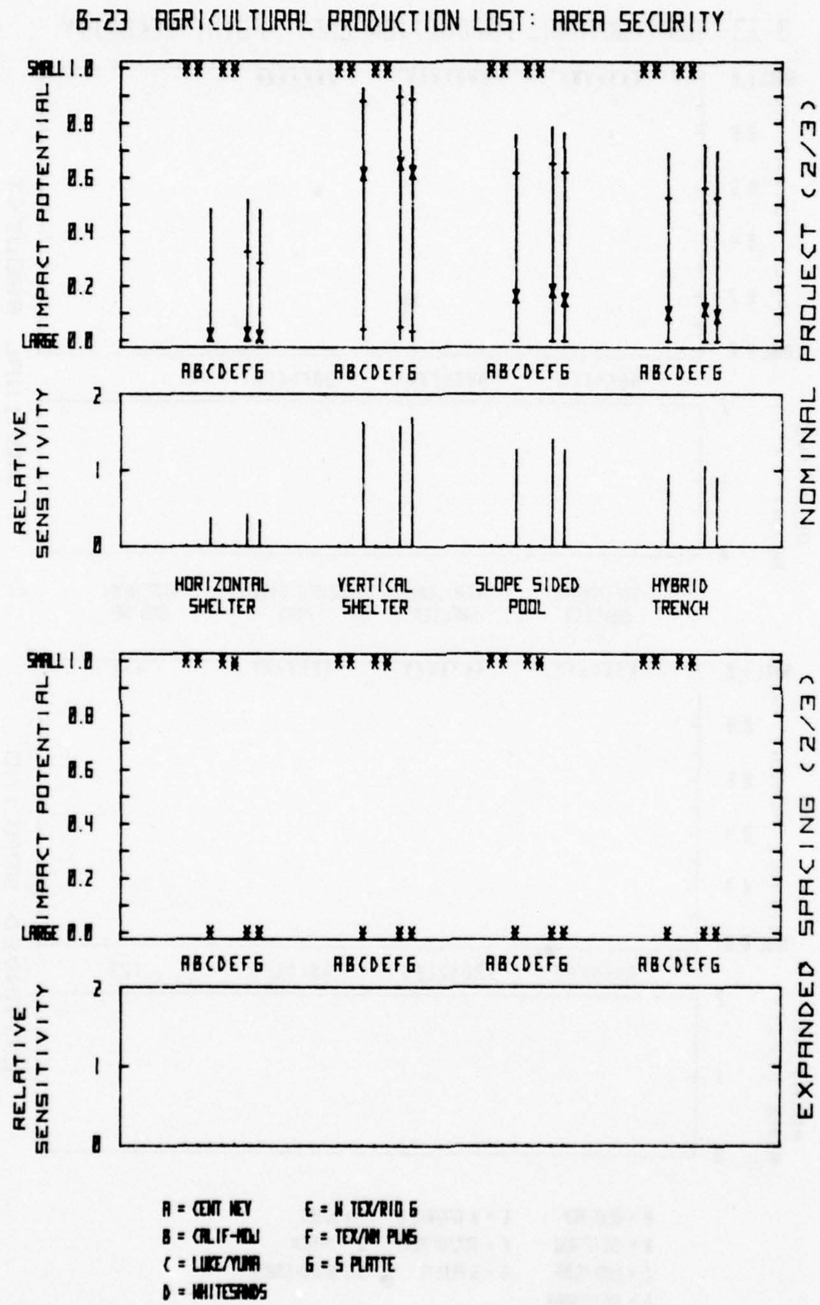


Figure B-119

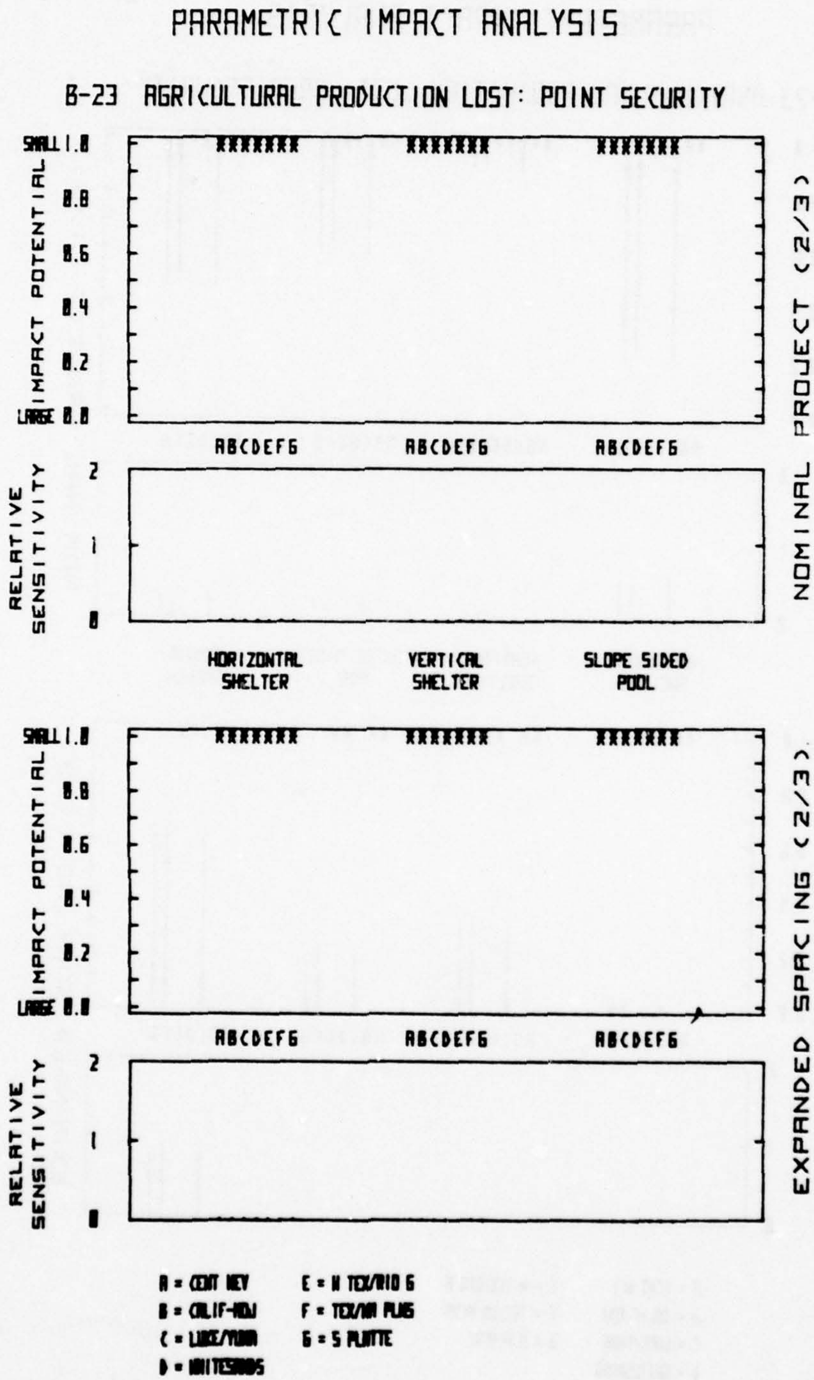

PARAMETRIC IMPACT ANALYSIS
B-23 AGRICULTURAL PRODUCTION LOST: POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
XXXXXXX
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (2/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-120

PARAMETRIC IMPACT ANALYSIS

B-23 AGRICULTURAL PRODUCTION LOST: AREA SECURITY

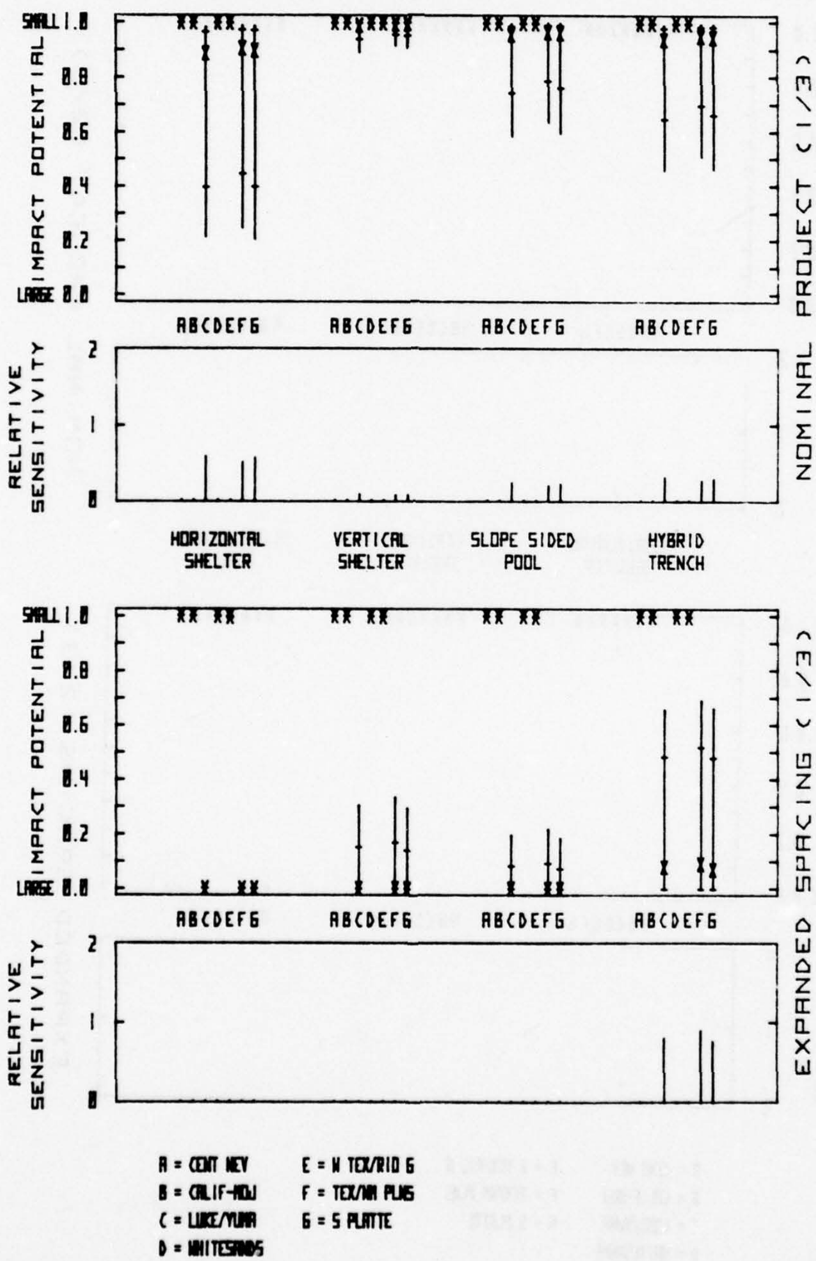


Figure B-121

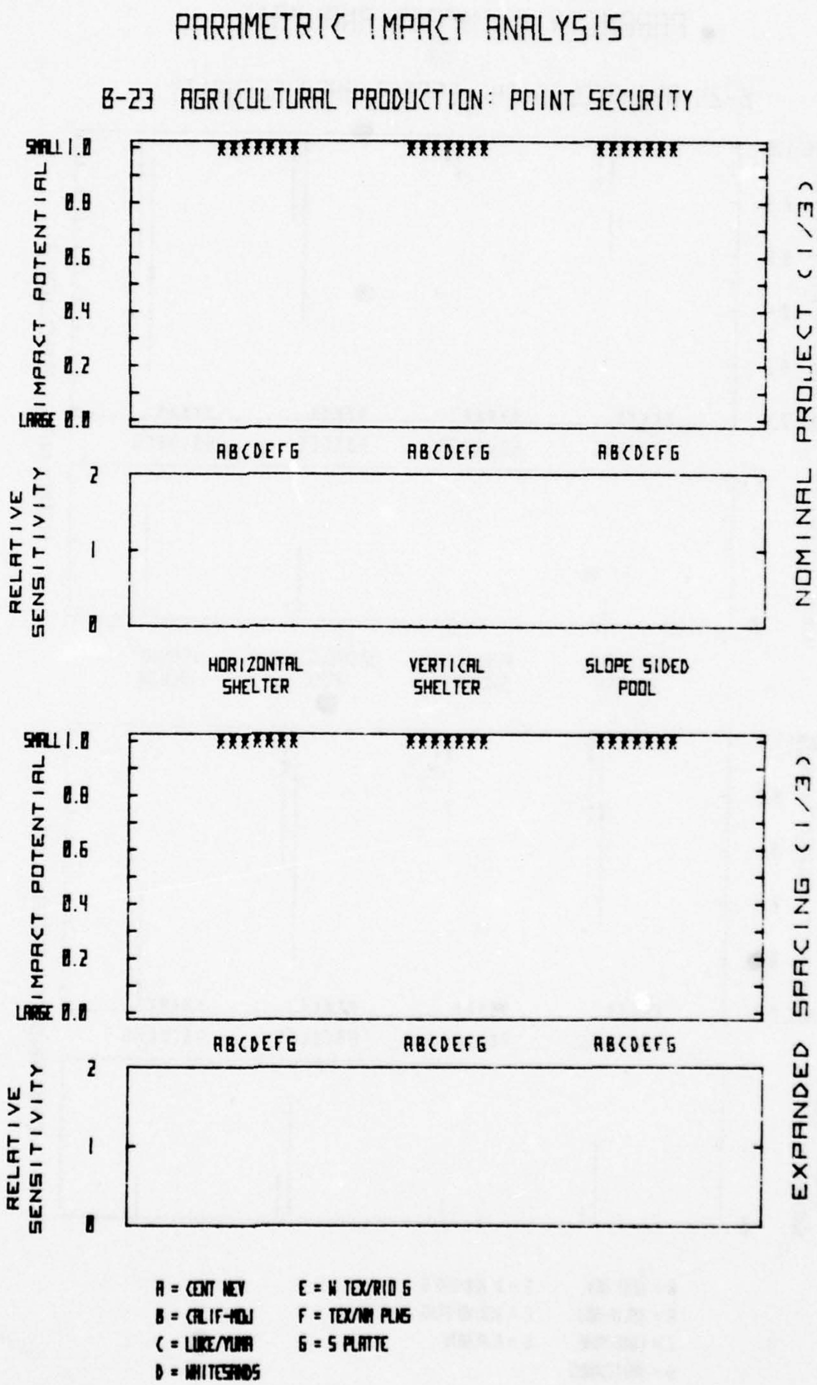

PARAMETRIC IMPACT ANALYSIS
B-23 AGRICULTURAL PRODUCTION: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (1/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-122

PARAMETRIC IMPACT ANALYSIS

B-24: ARCHAEOLOGICAL EFFECT: AREA SECURITY

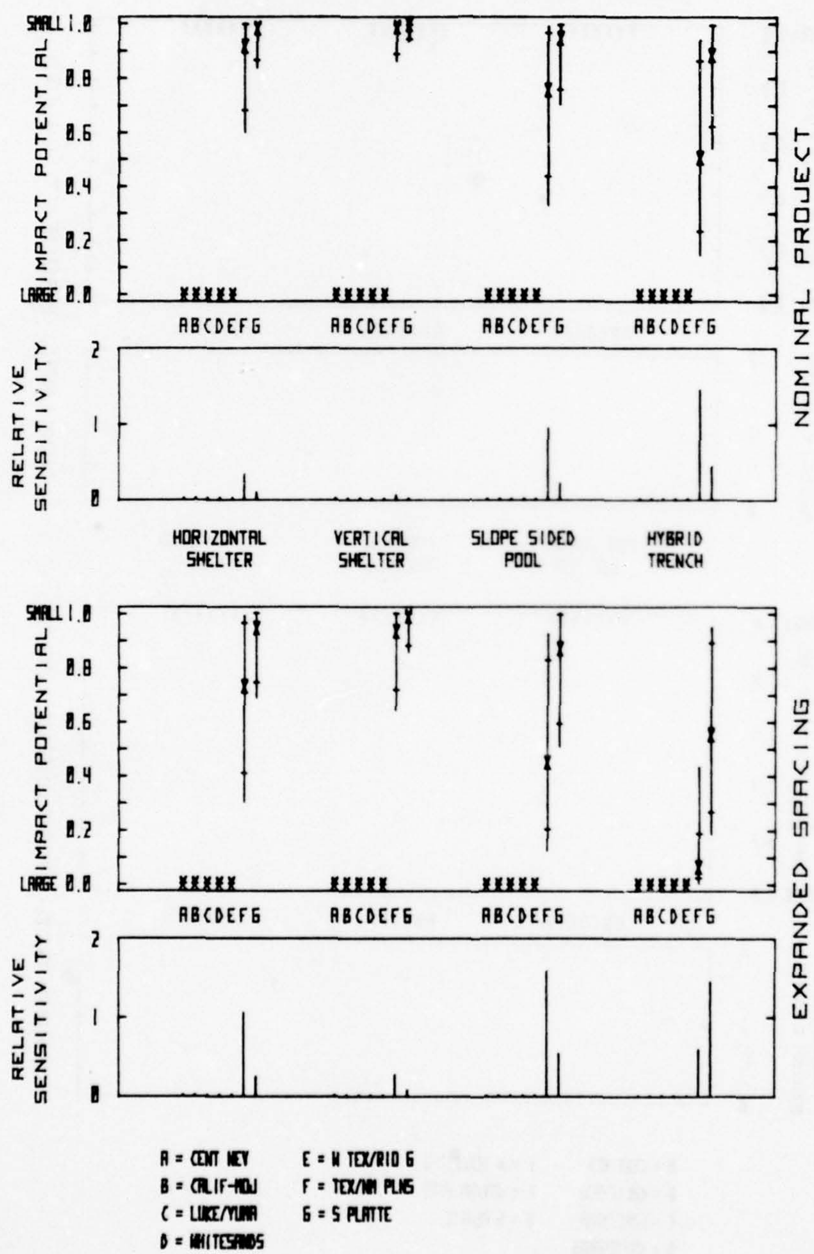


Figure B-123

PARAMETRIC IMPACT ANALYSIS

B-24: ARCHAEOLOGICAL EFFECT :POINT SECURITY

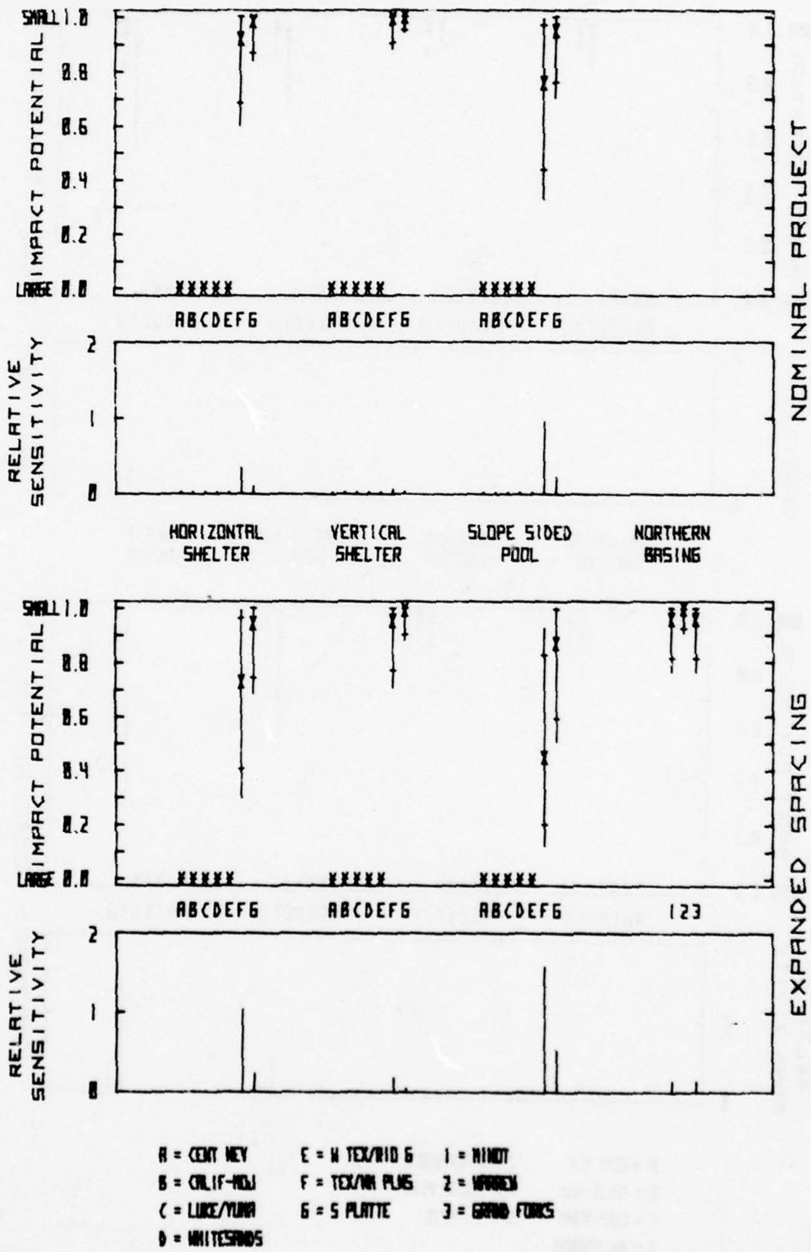


Figure B-124

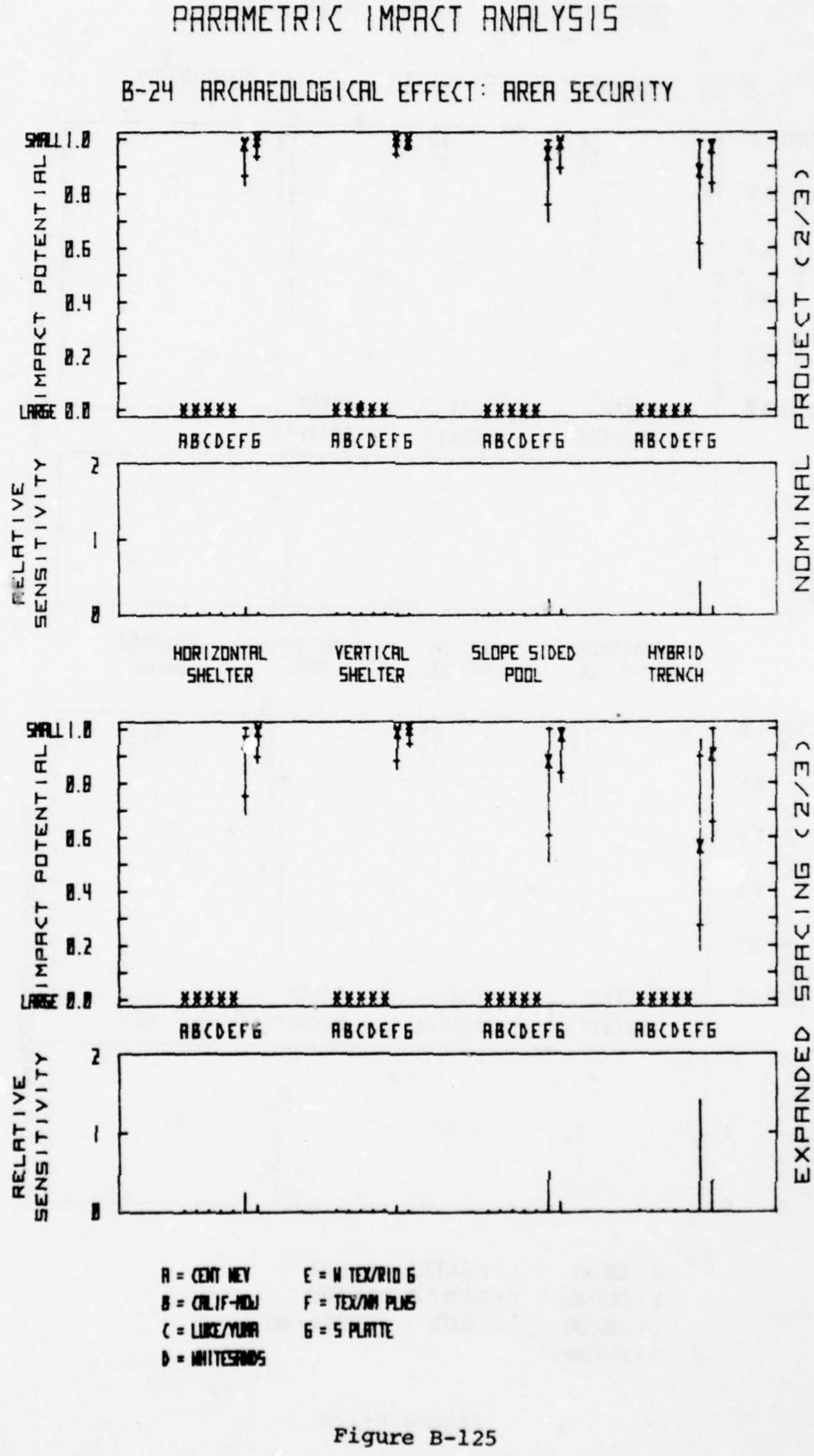

PARAMETRIC IMPACT ANALYSIS
B-24 ARCHAEOLOGICAL EFFECT: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-125

PARAMETRIC IMPACT ANALYSIS

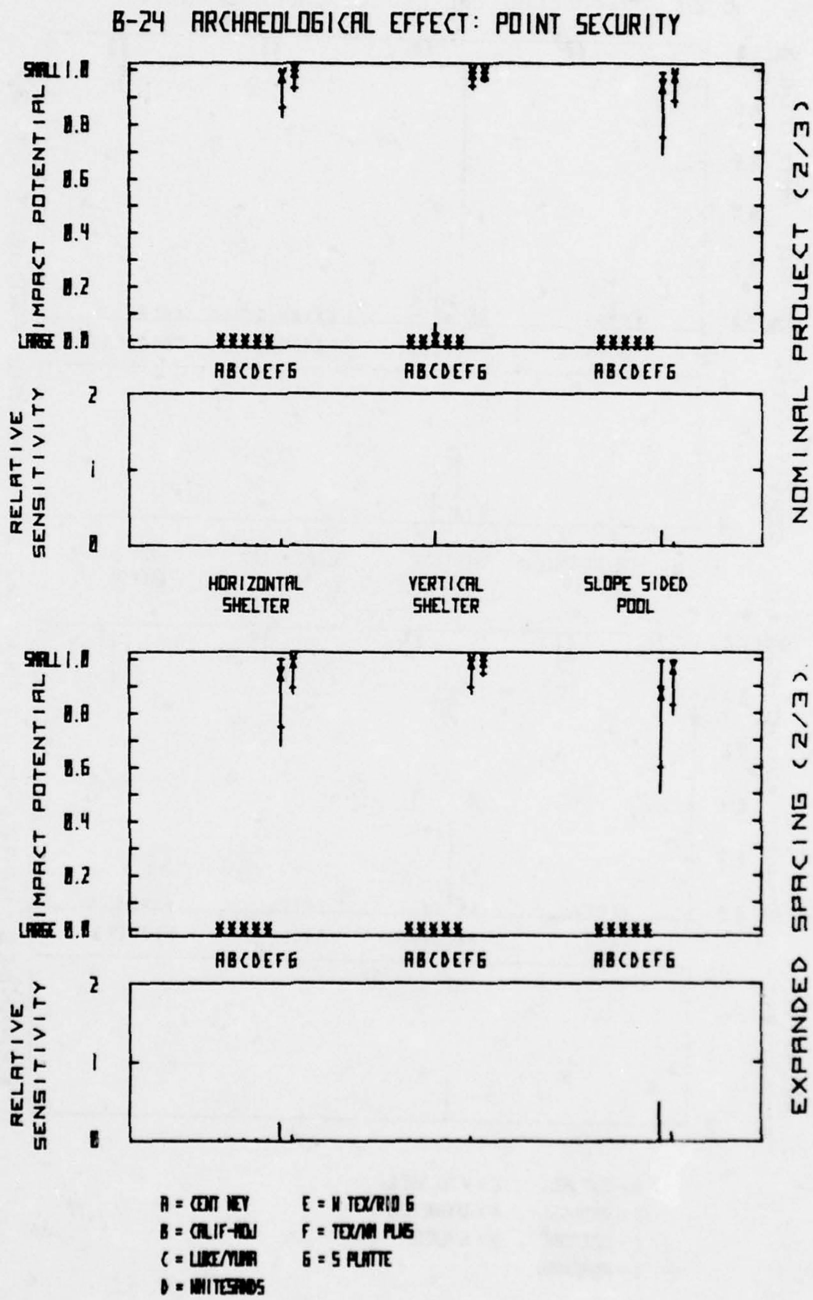


Figure B-126

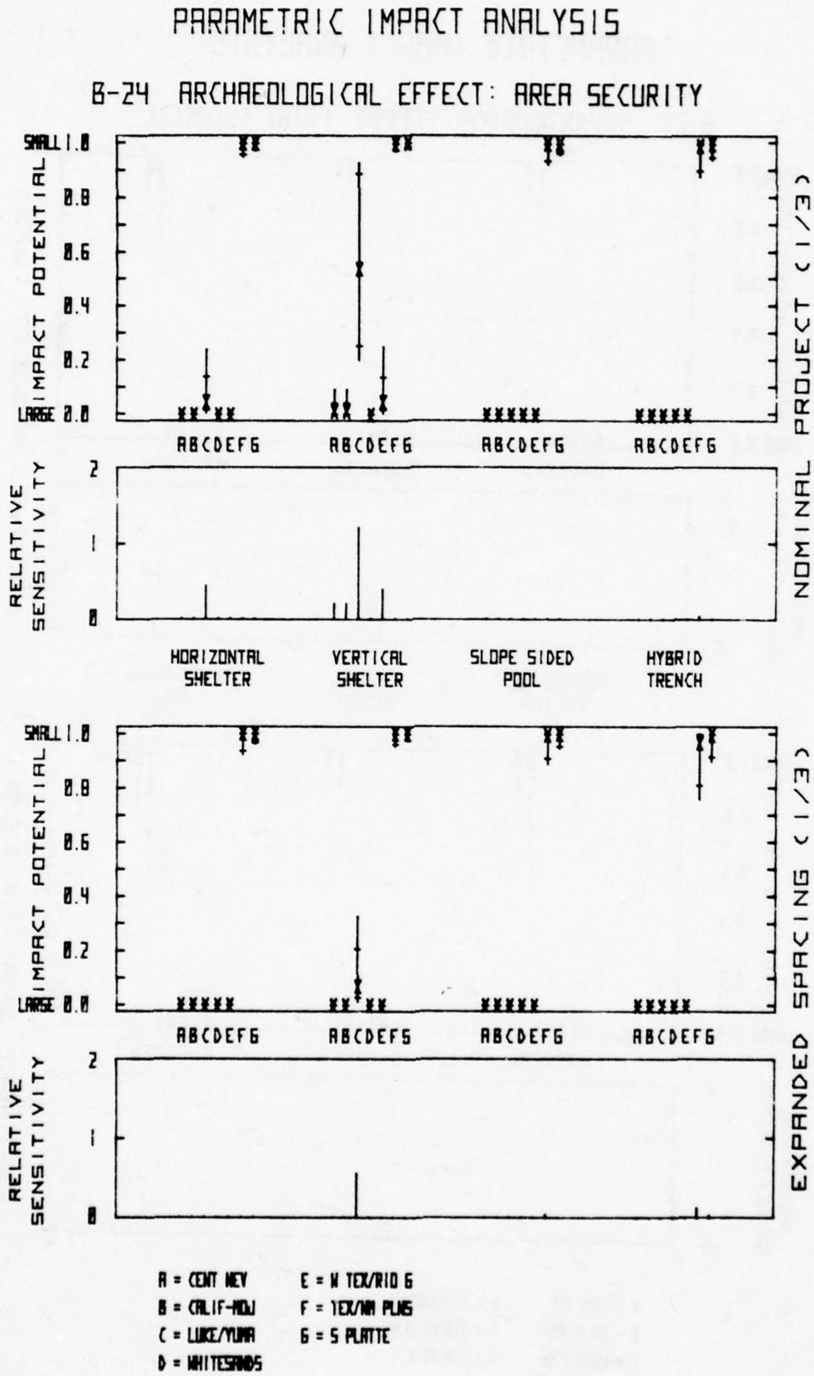

PARAMETRIC IMPACT ANALYSIS
B-24 ARCHAEOLOGICAL EFFECT: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (1/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-127

PARAMETRIC IMPACT ANALYSIS

B-24 ARCHAEOLOGICAL EFFECT: POINT SECURITY

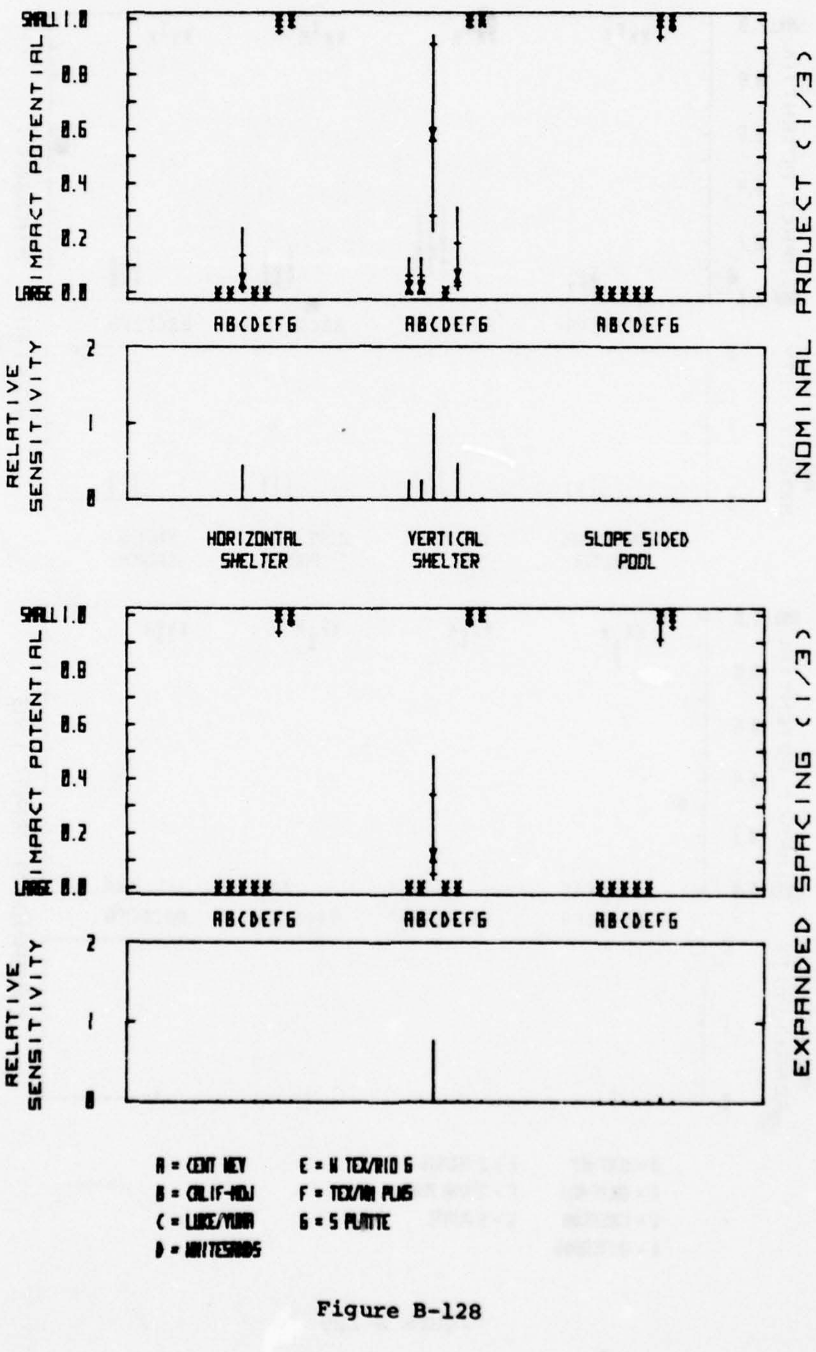
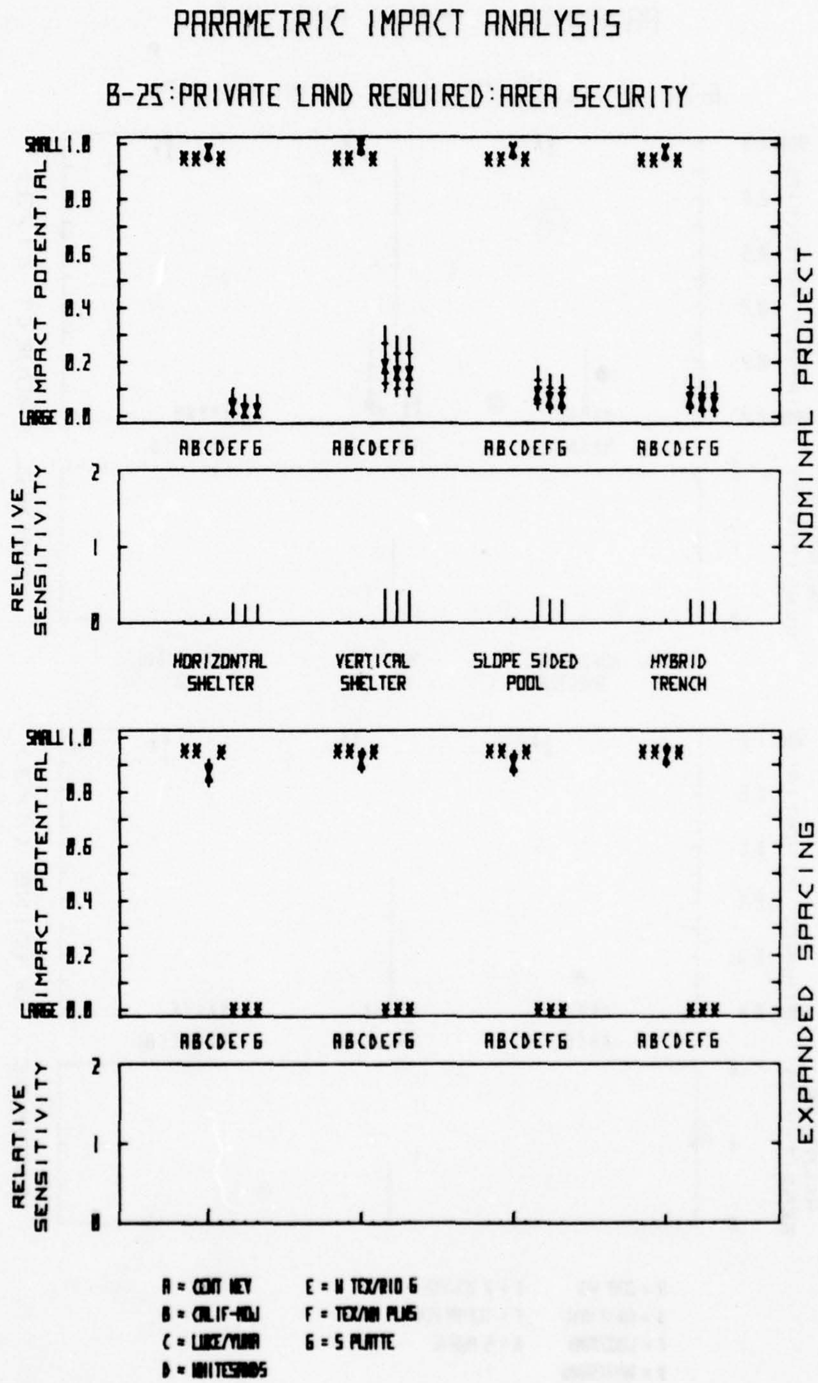


Figure B-128



PARAMETRIC IMPACT ANALYSIS
B-25:PRIVATE LAND REQUIRED:AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING

Figure B-129

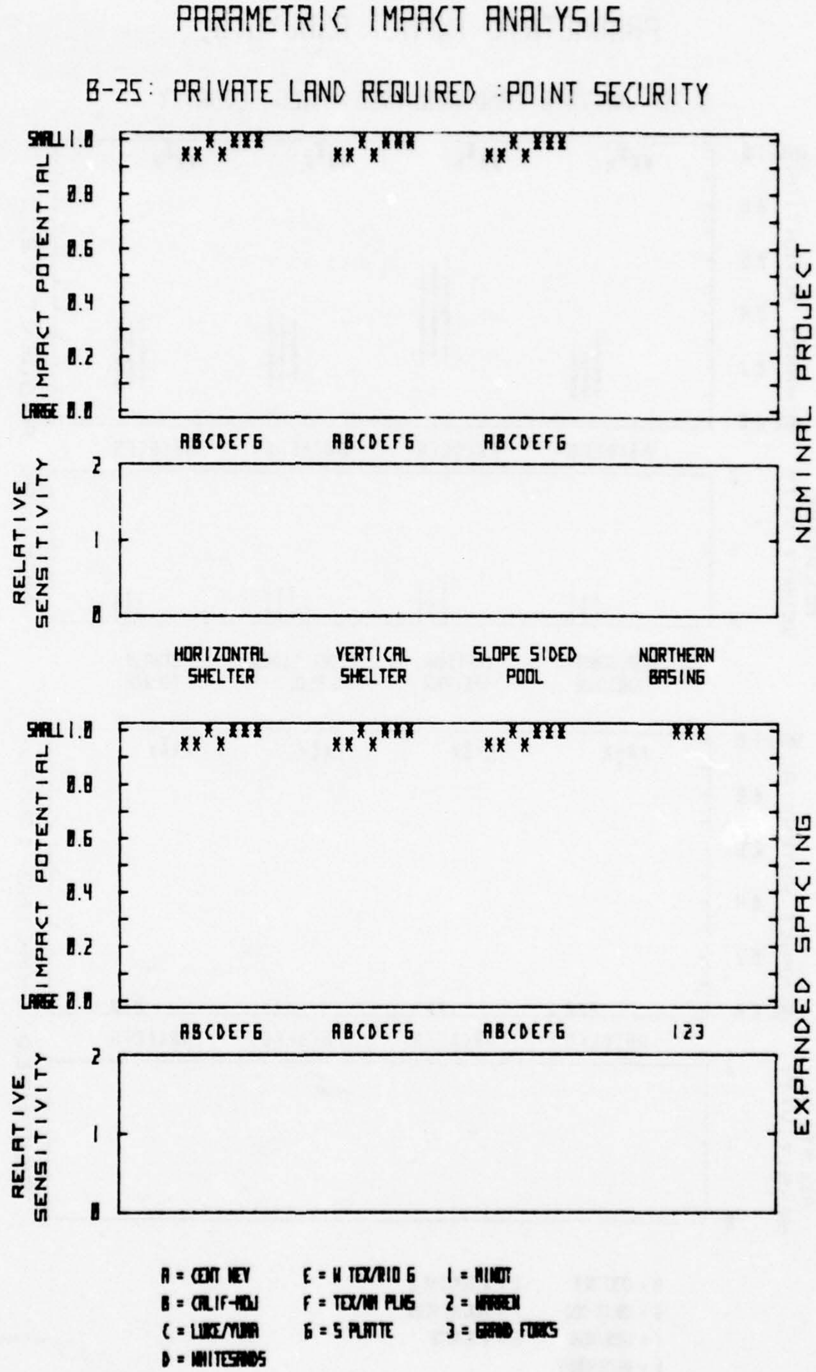

PARAMETRIC IMPACT ANALYSIS
B-25: PRIVATE LAND REQUIRED :POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG ABCDEFG ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
ABCDEFG ABCDEFG ABCDEFG 123
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-130

PARAMETRIC IMPACT ANALYSIS

B-25 PRIVATE LAND REQUIRED: AREA SECURITY

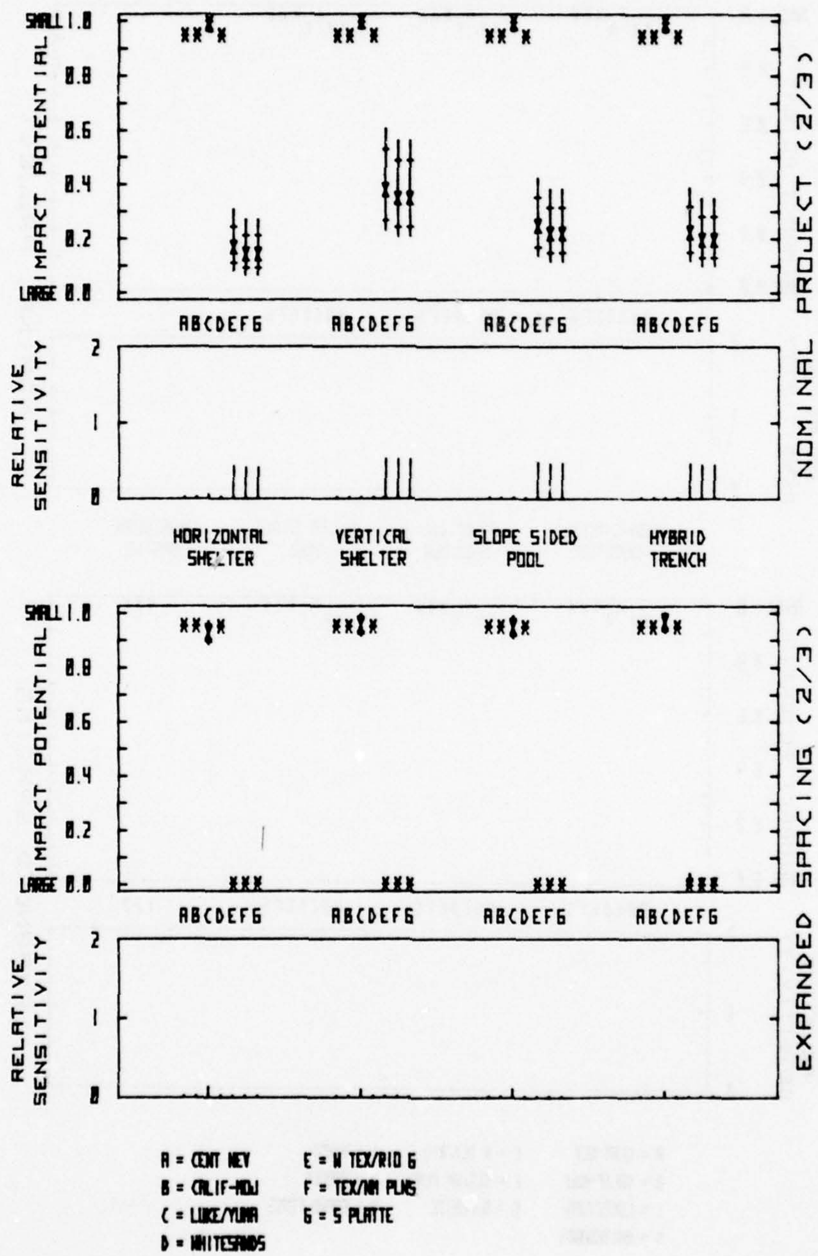


Figure B-131

PARAMETRIC IMPACT ANALYSIS

B-25 PRIVATE LAND REQUIRED: POINT SECURITY

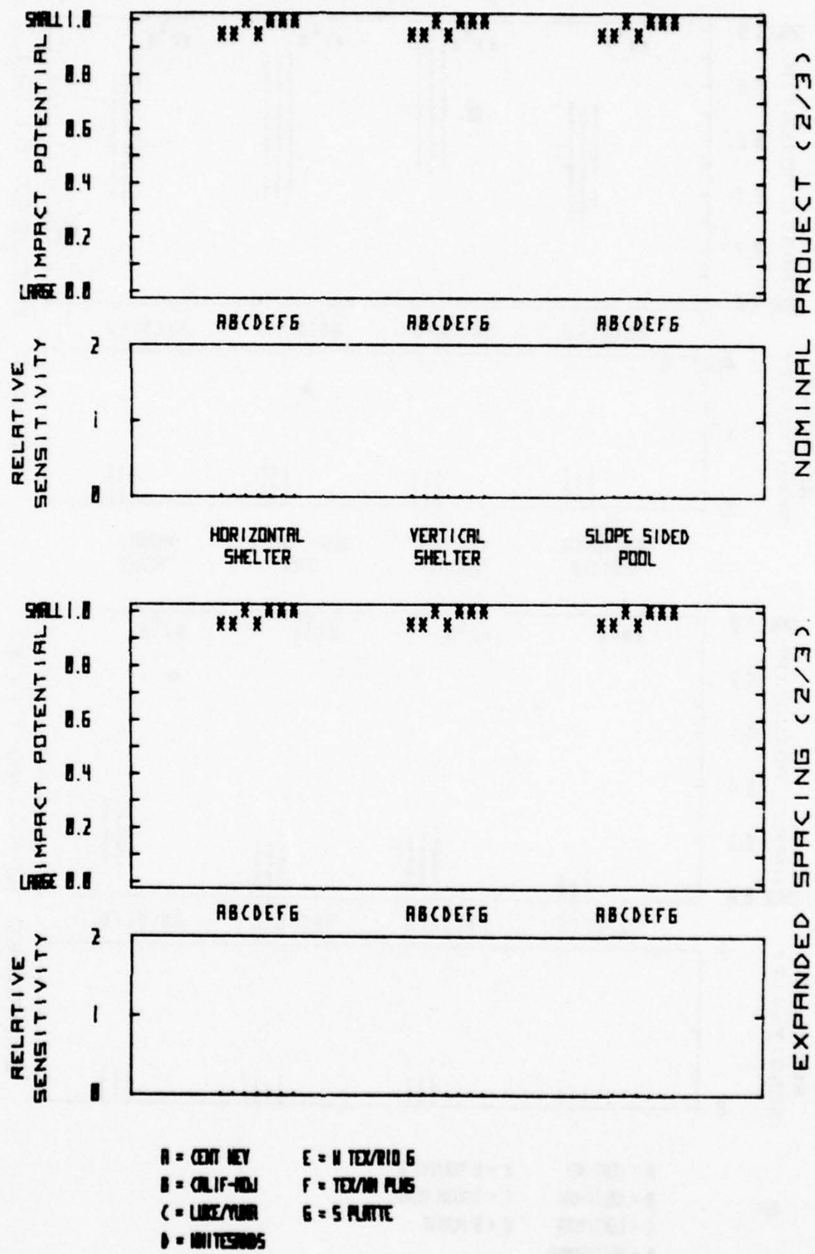


Figure B-132

PARAMETRIC IMPACT ANALYSIS

B-25 PRIVATE LAND REQUIRED: AREA SECURITY

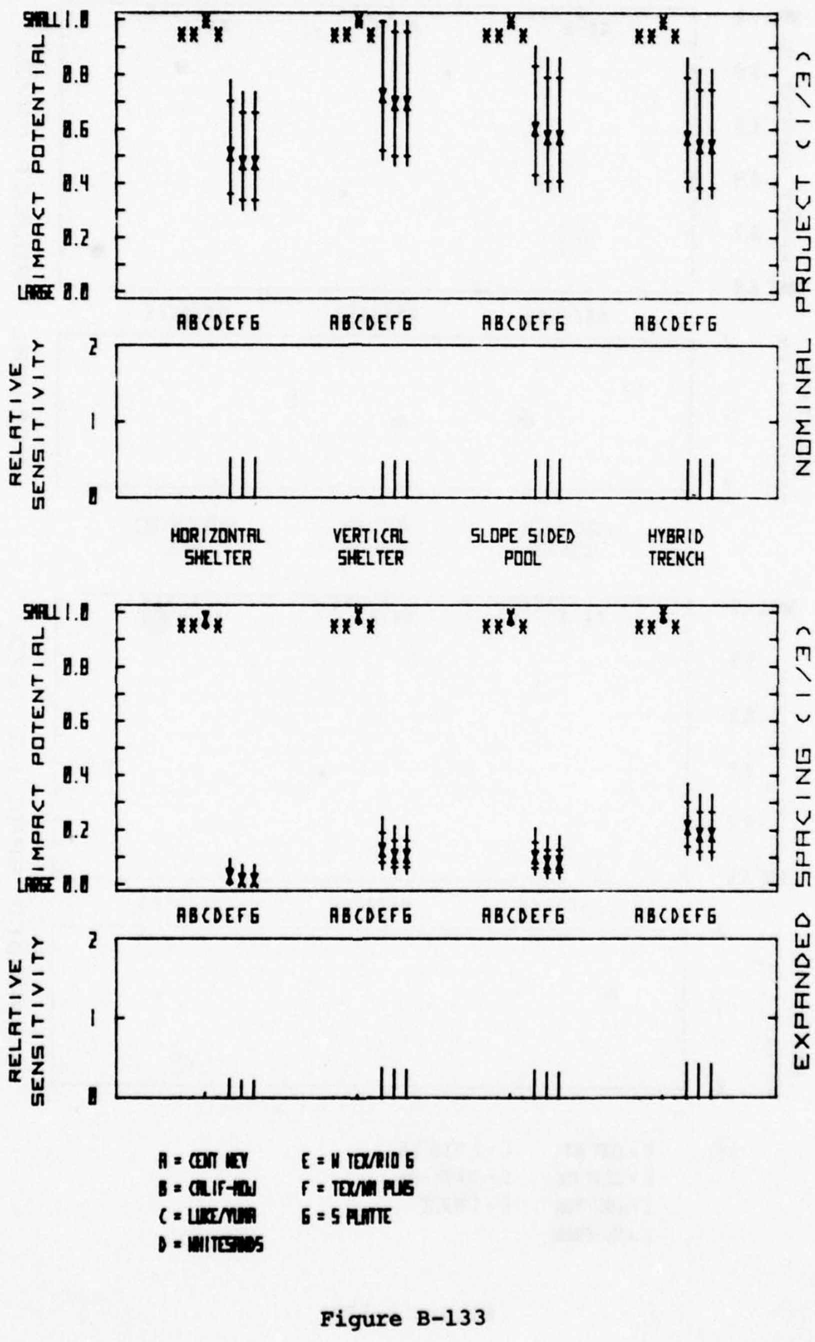


Figure B-133

PARAMETRIC IMPACT ANALYSIS

B-25 PRIVATE LAND REQUIRED: POINT SECURITY

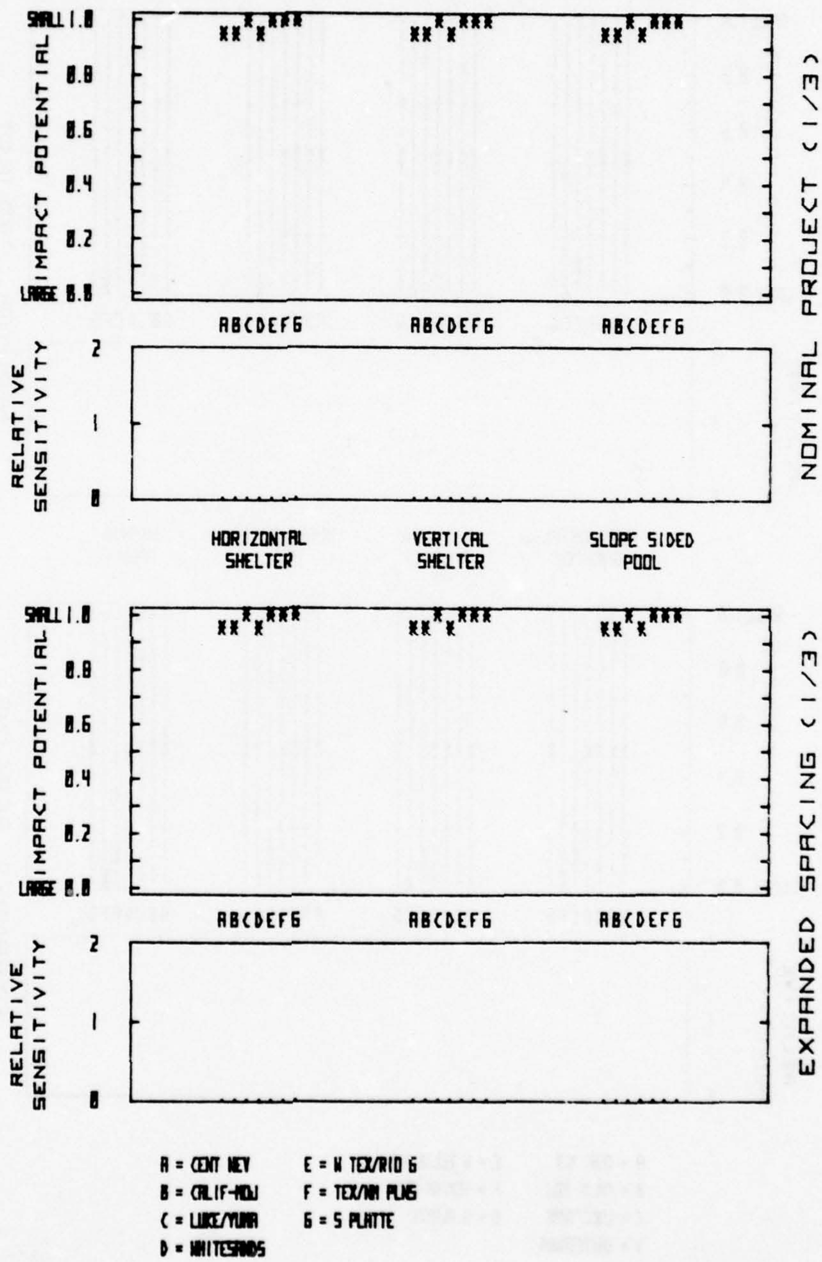


Figure B-134

PARAMETRIC IMPACT ANALYSIS

B-26: ELECTRIC POWER DEMAND: AREA SECURITY

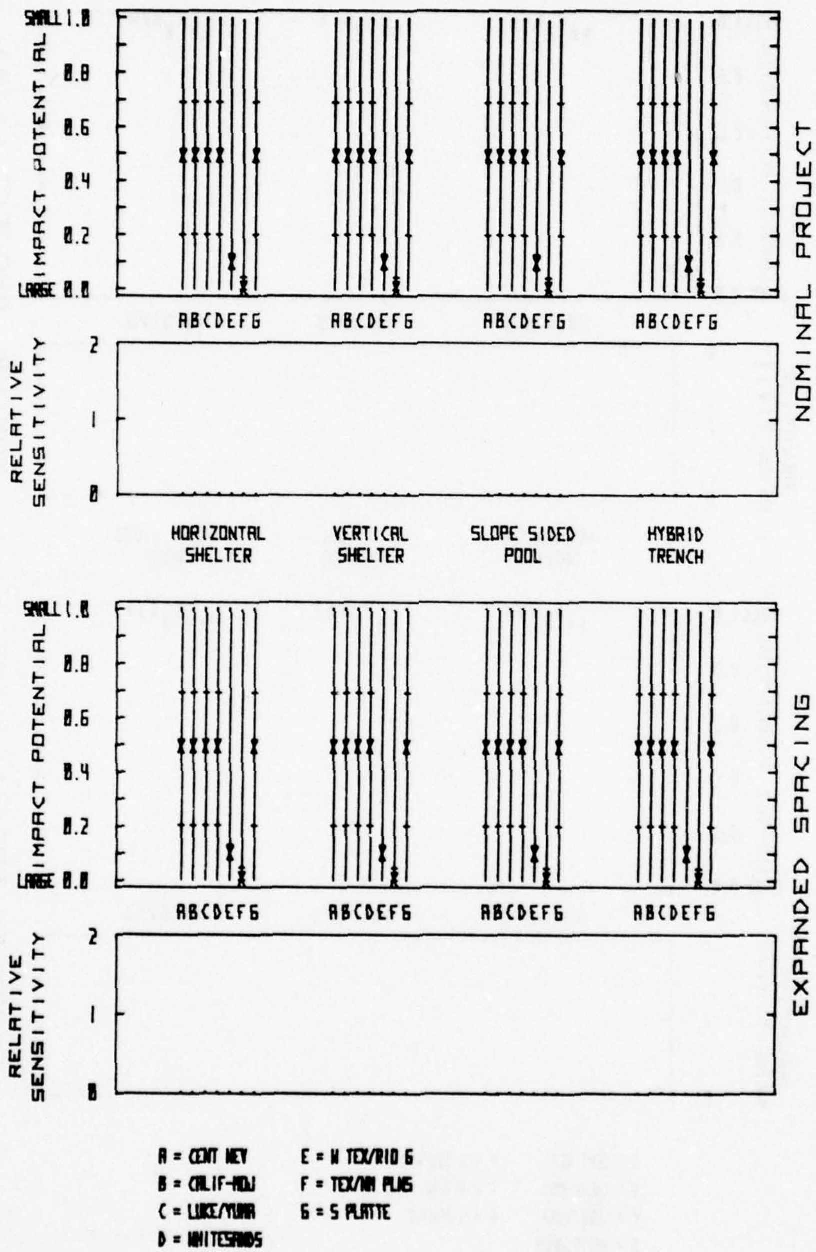


Figure B-135

PARAMETRIC IMPACT ANALYSIS

B-26: ELECTRIC POWER DEMAND: POINT SECURITY

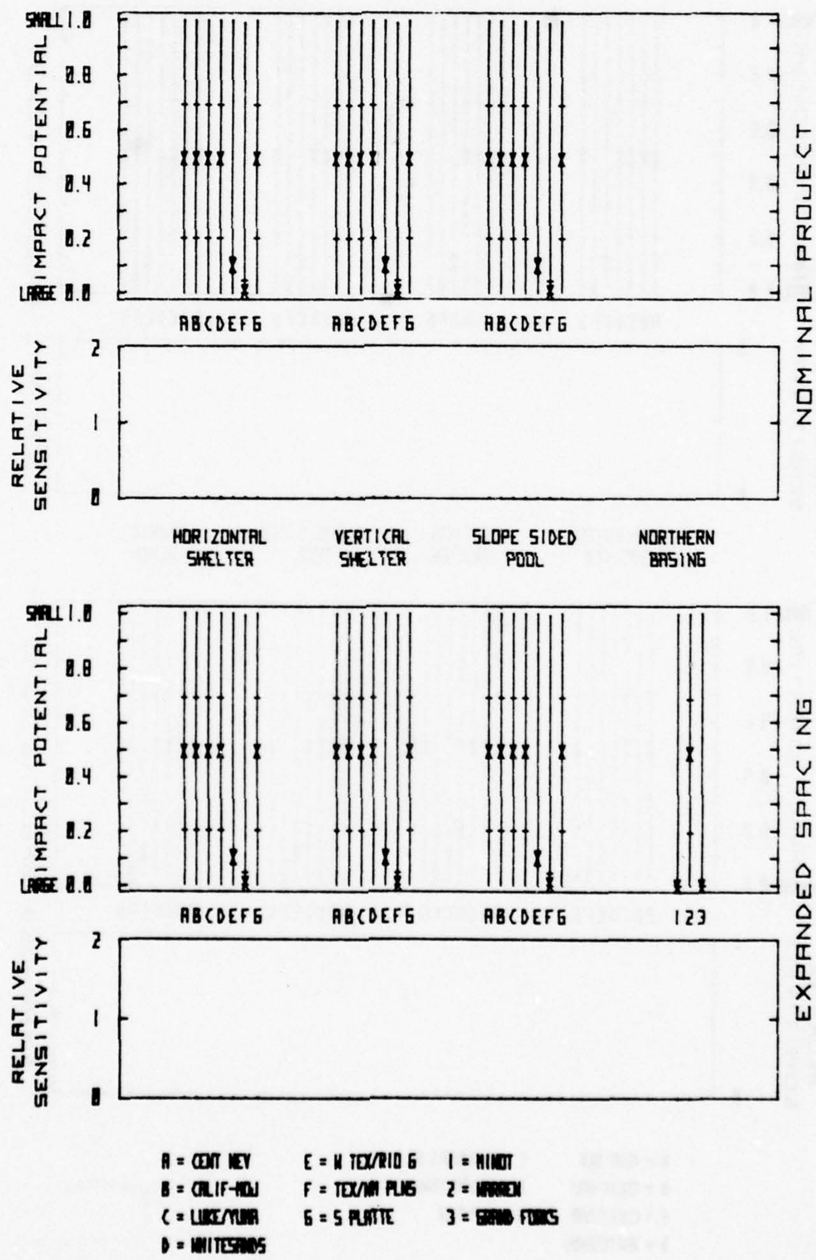


Figure B-136

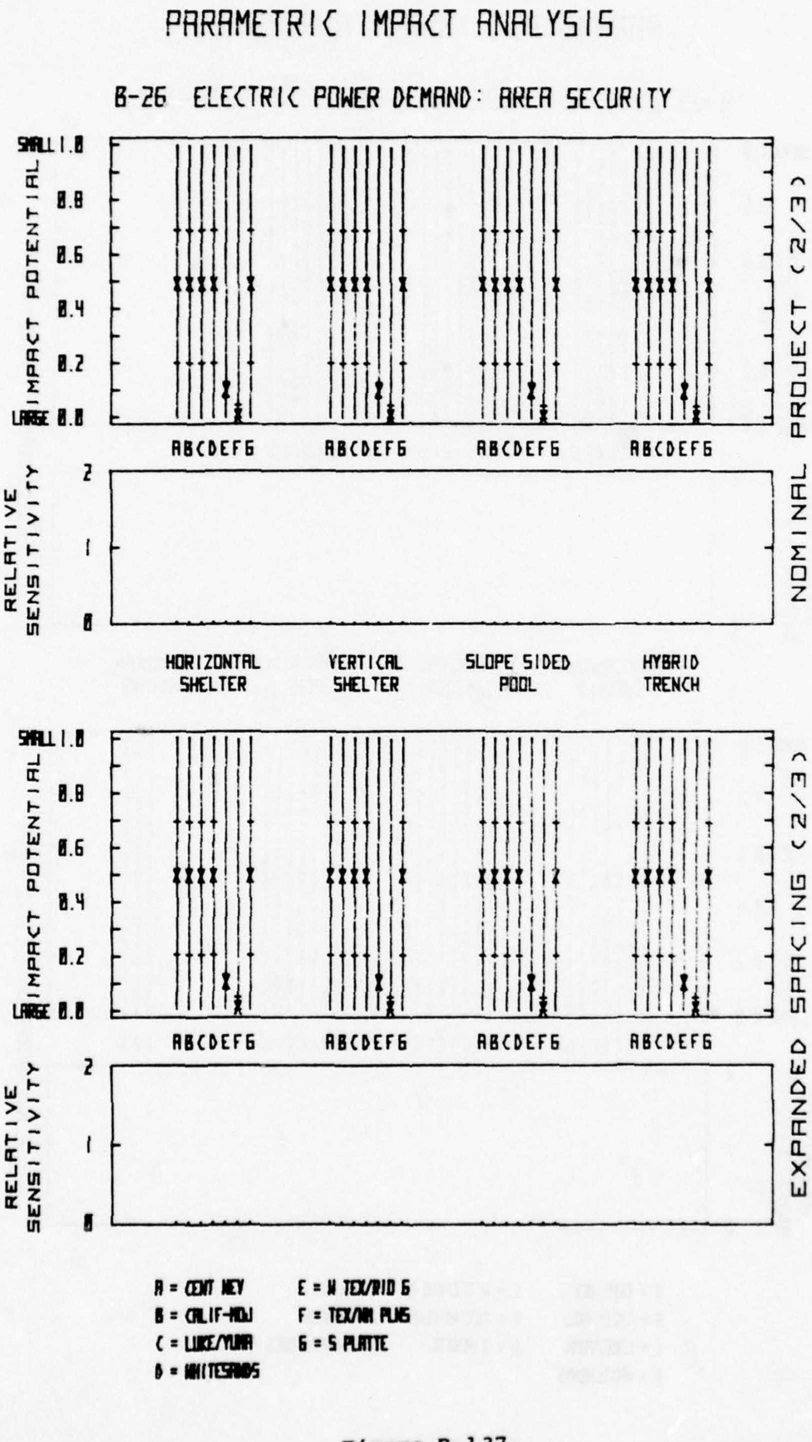

PARAMETRIC IMPACT ANALYSIS
B-26 ELECTRIC POWER DEMAND: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-ARIZ
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-137

PARAMETRIC IMPACT ANALYSIS

B-26 ELECTRIC POWER DEMAND: POINT SECURITY

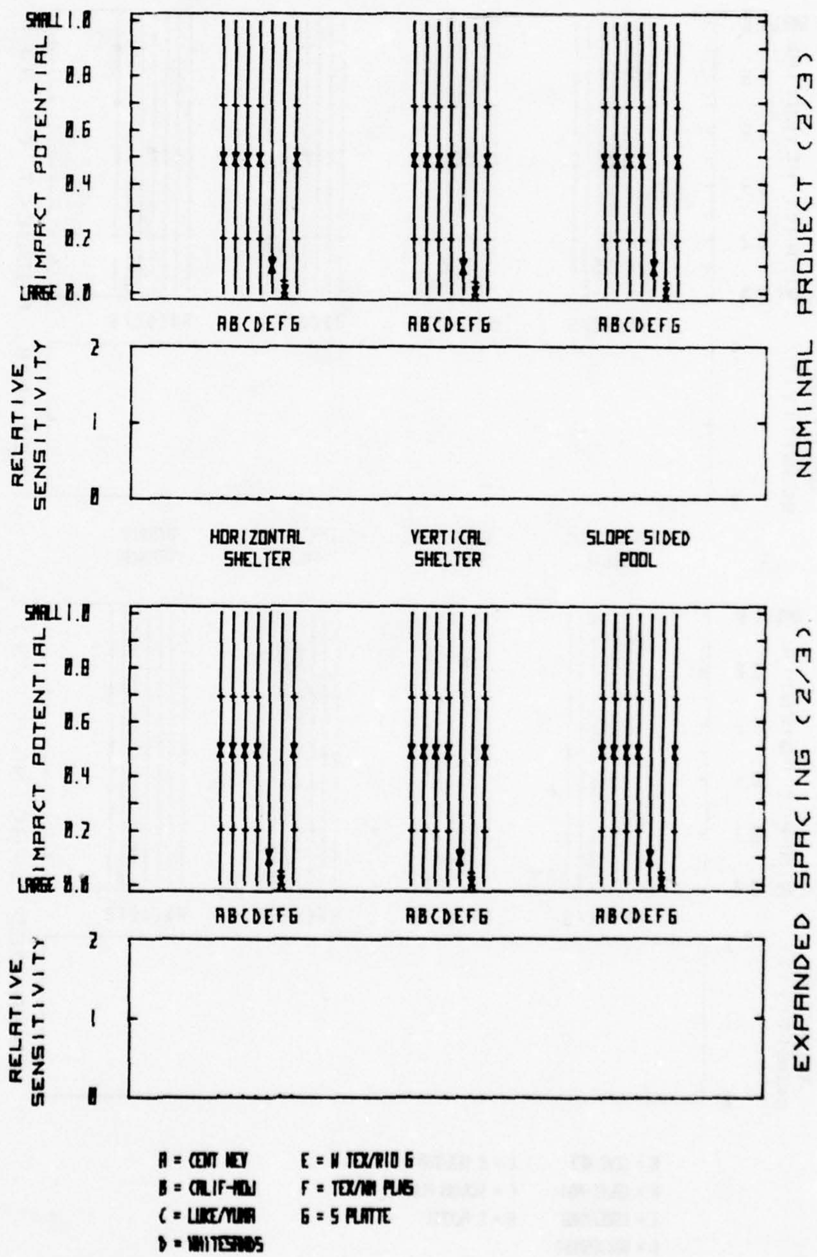
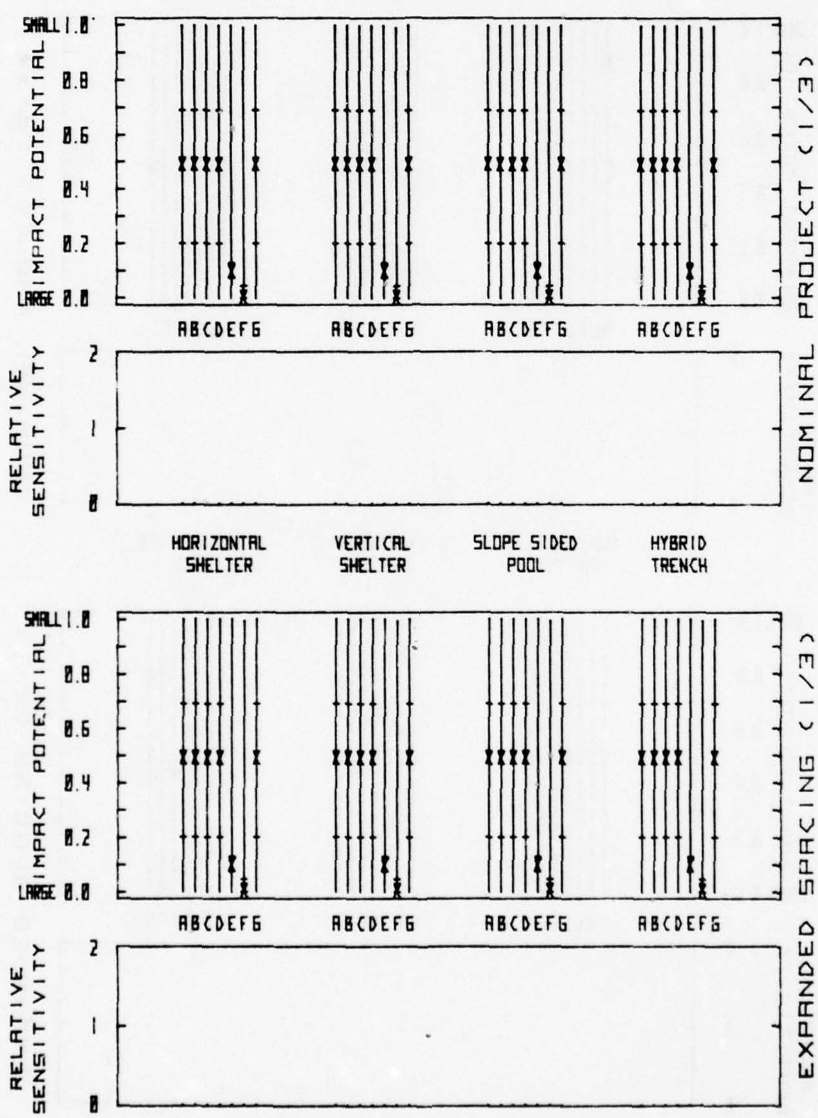


Figure B-138

PARAMETRIC IMPACT ANALYSIS

B-26 ELECTRIC POWER DEMAND: AREA SECURITY



A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-139

PARAMETRIC IMPACT ANALYSIS

B-26 ELECTRIC POWER DEMAND: POINT SECURITY

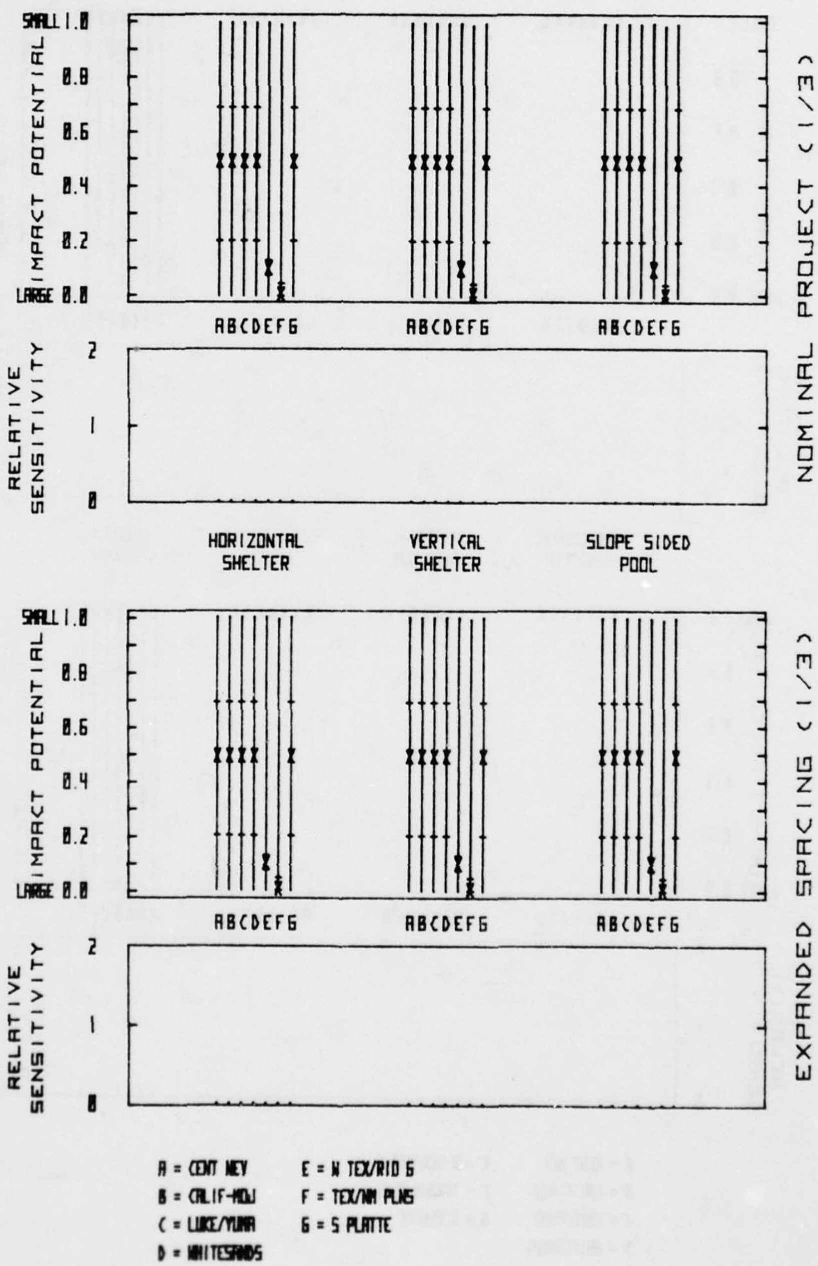


Figure B-140

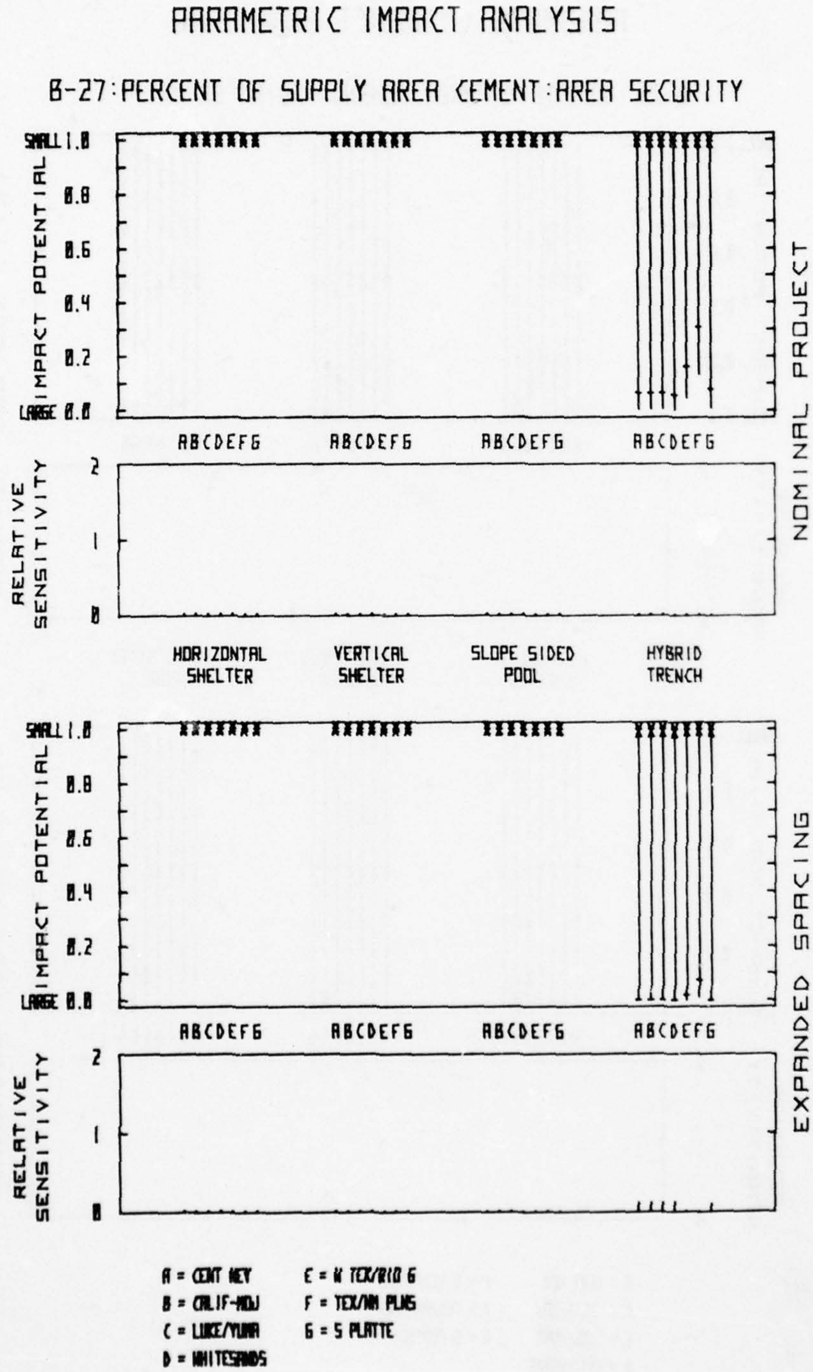

PARAMETRIC IMPACT ANALYSIS
B-27:PERCENT OF SUPPLY AREA CEMENT:AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-141

PARAMETRIC IMPACT ANALYSIS

B-27: PERCENT OF SUPPLY AREA CEMENT: POINT SECURITY

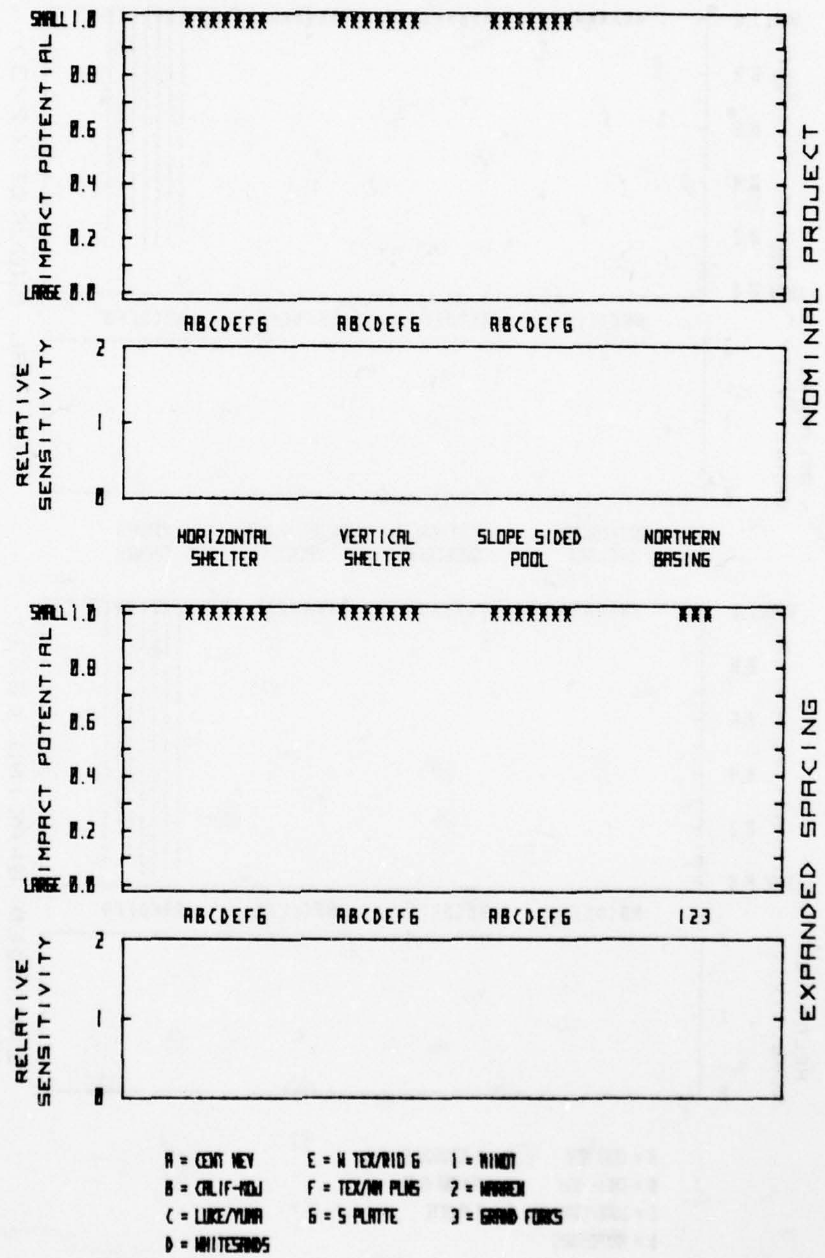


Figure B-142

PARAMETRIC IMPACT ANALYSIS

B-27 PERCENT OF SUPPLY AREA CEMENT: AREA SECURITY

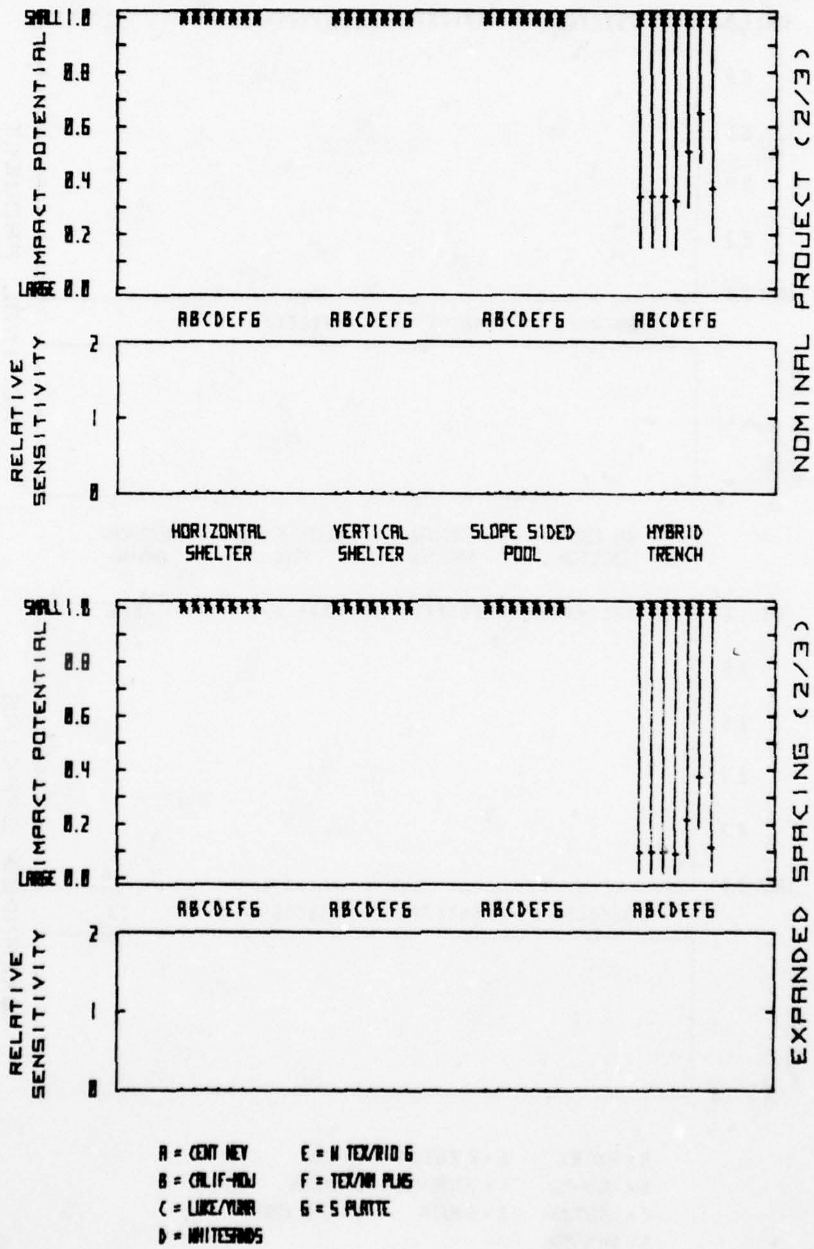


Figure B-143

PARAMETRIC IMPACT ANALYSIS

B-27 PERCENT OF SUPPLY AREA CEMENT: POINT SECURITY

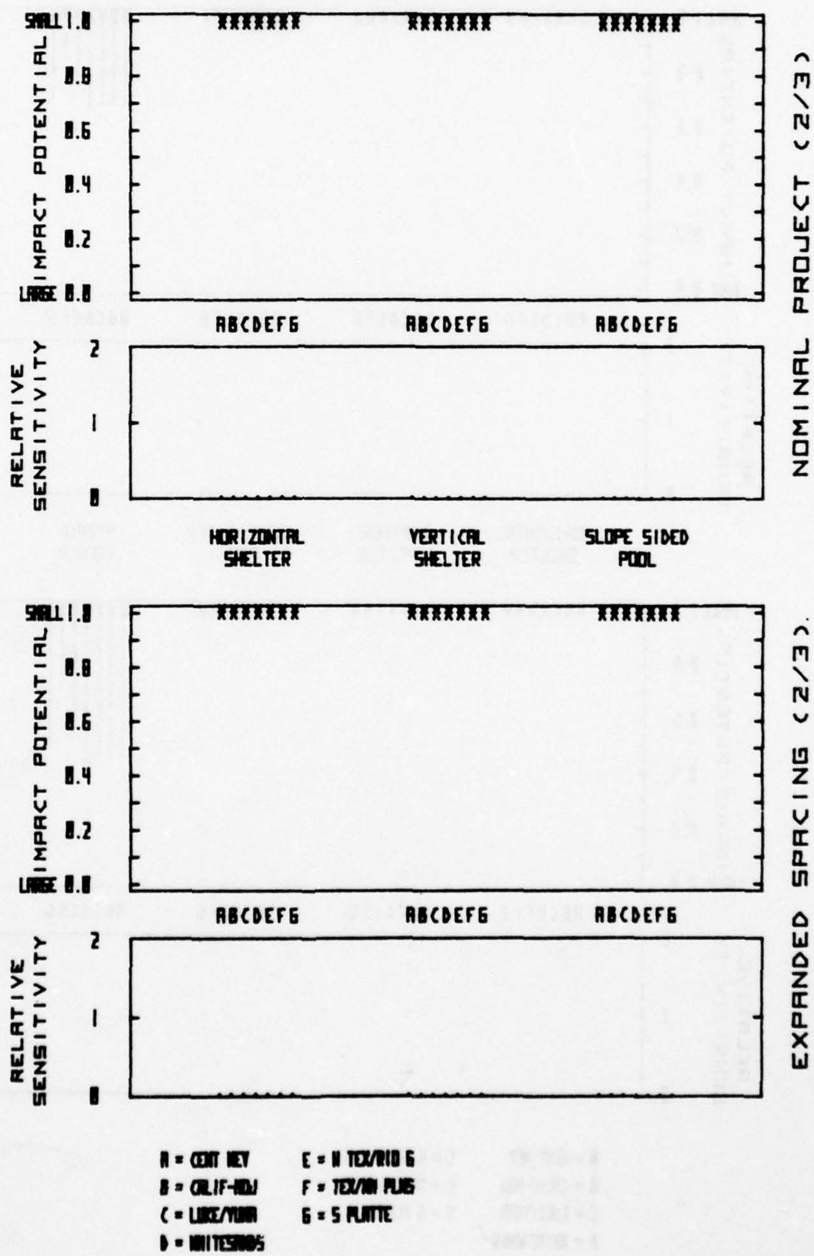


Figure B-144

PARAMETRIC IMPACT ANALYSIS

B-27 PERCENT OF SUPPLY AREA CEMENT: AREA SECURITY

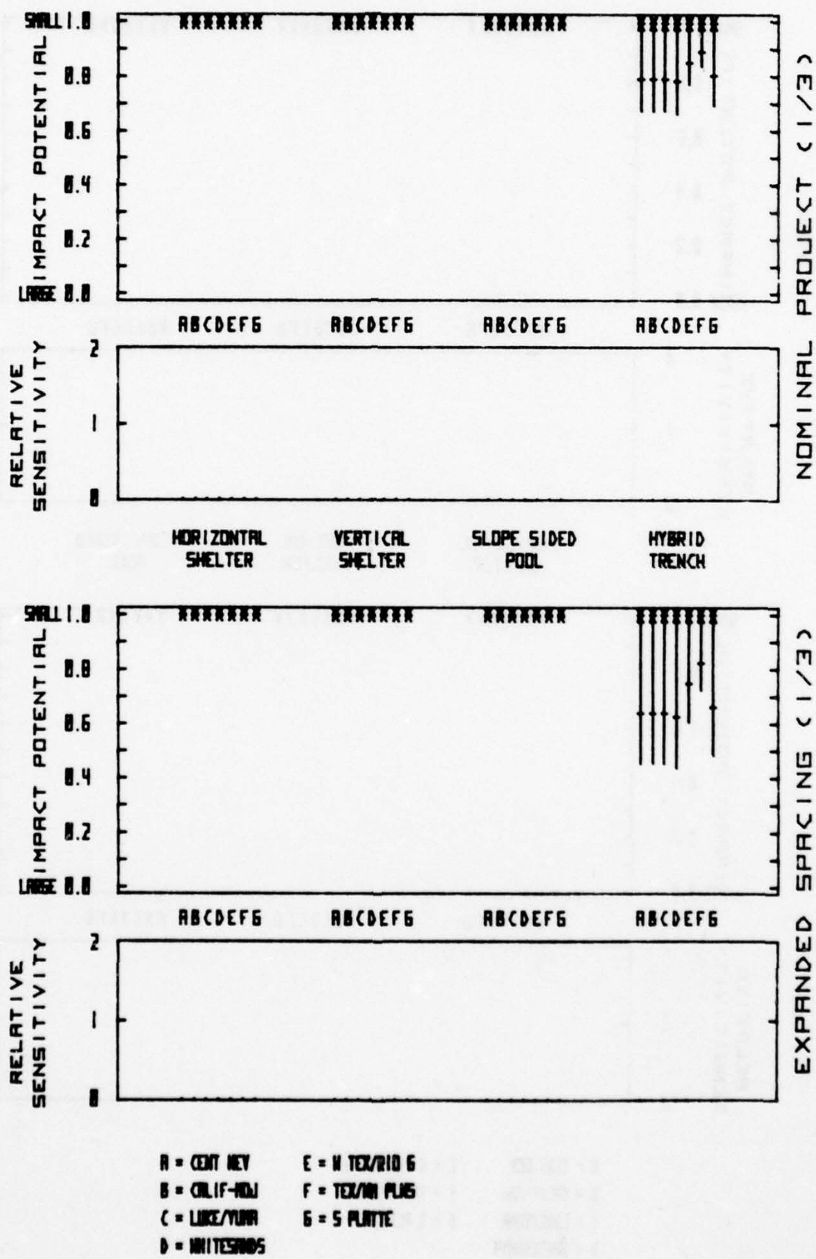


Figure B-145

PARAMETRIC IMPACT ANALYSIS

B-27 PERCENT OF SUPPLY AREA CEMENT: POINT SECURITY

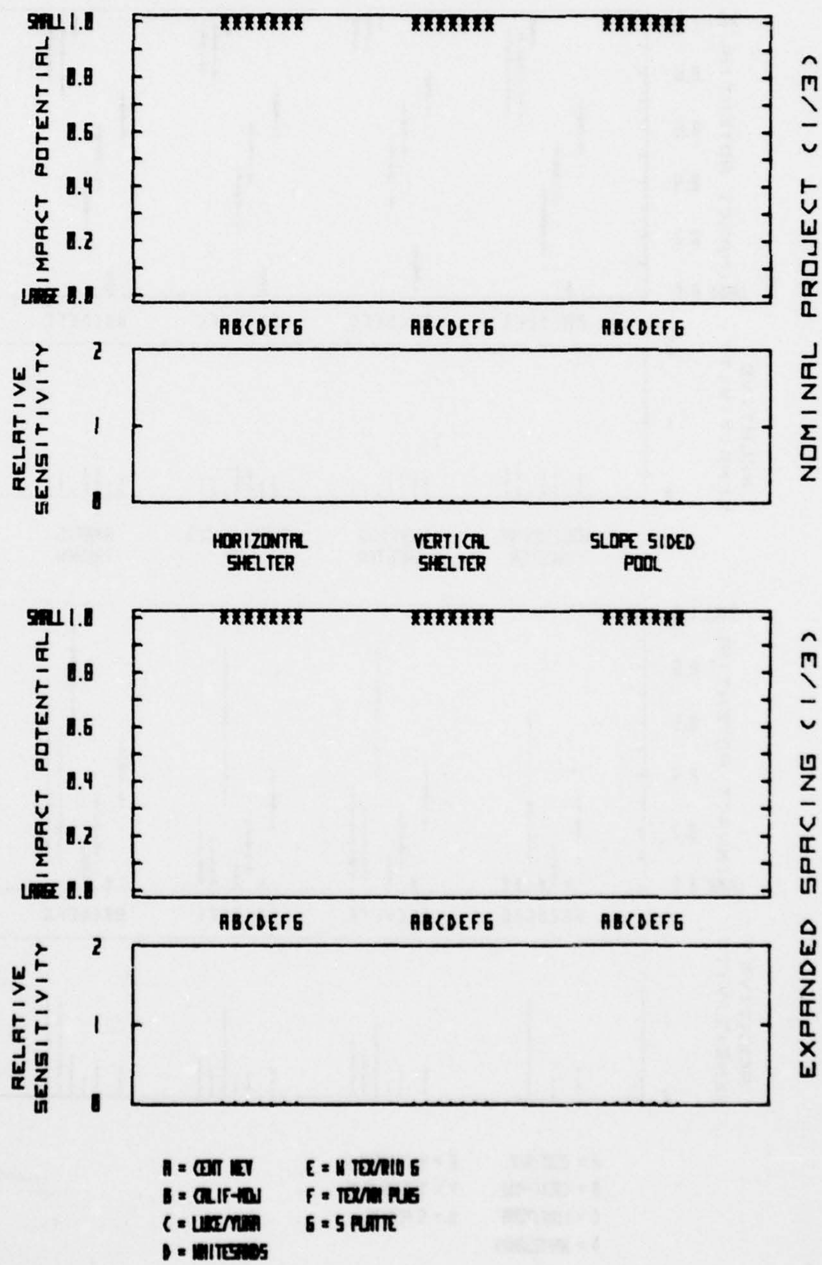


Figure B-146

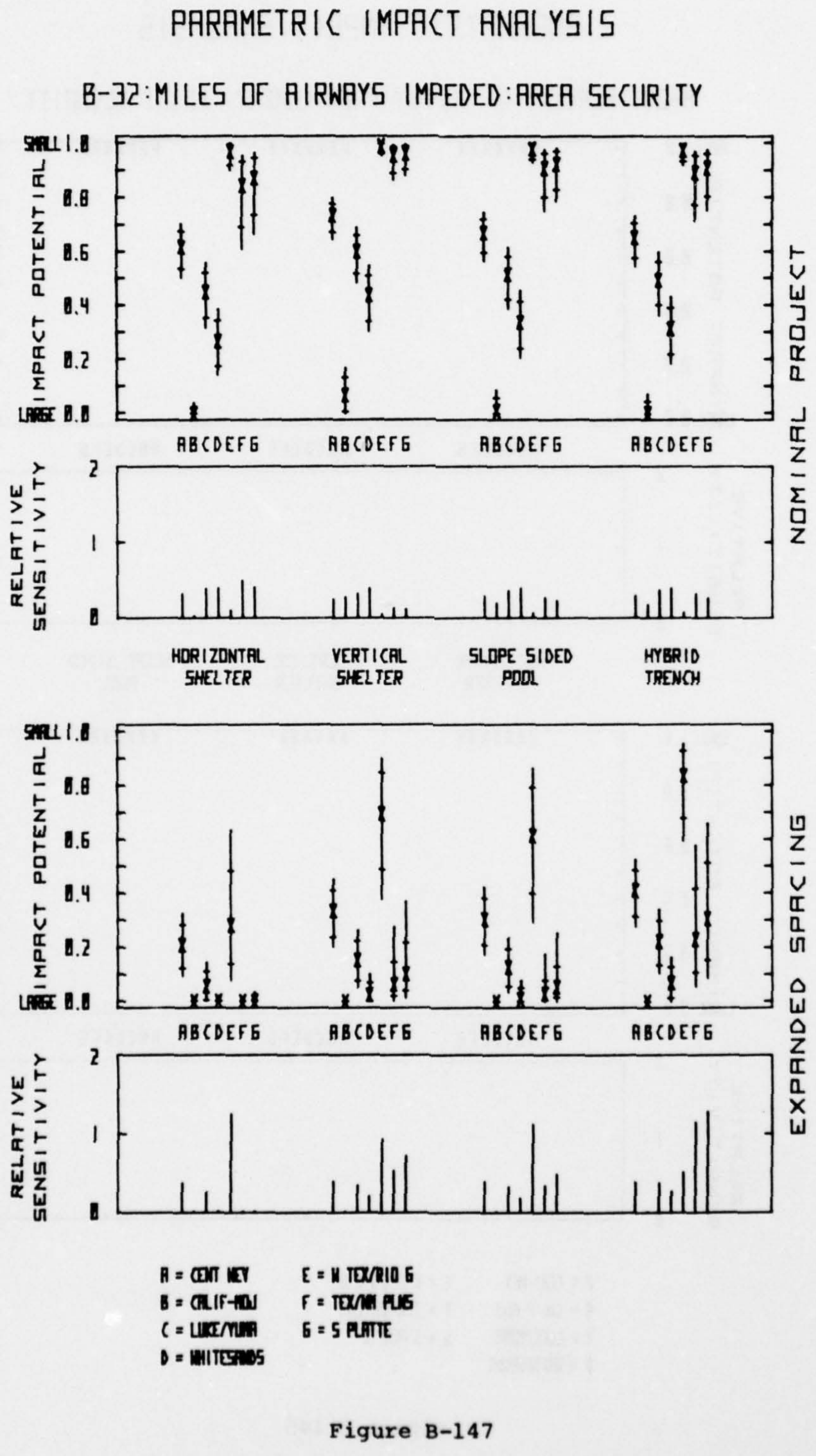

PARAMETRIC IMPACT ANALYSIS
B-32:MILES OF AIRWAYS IMPEDED:AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-147

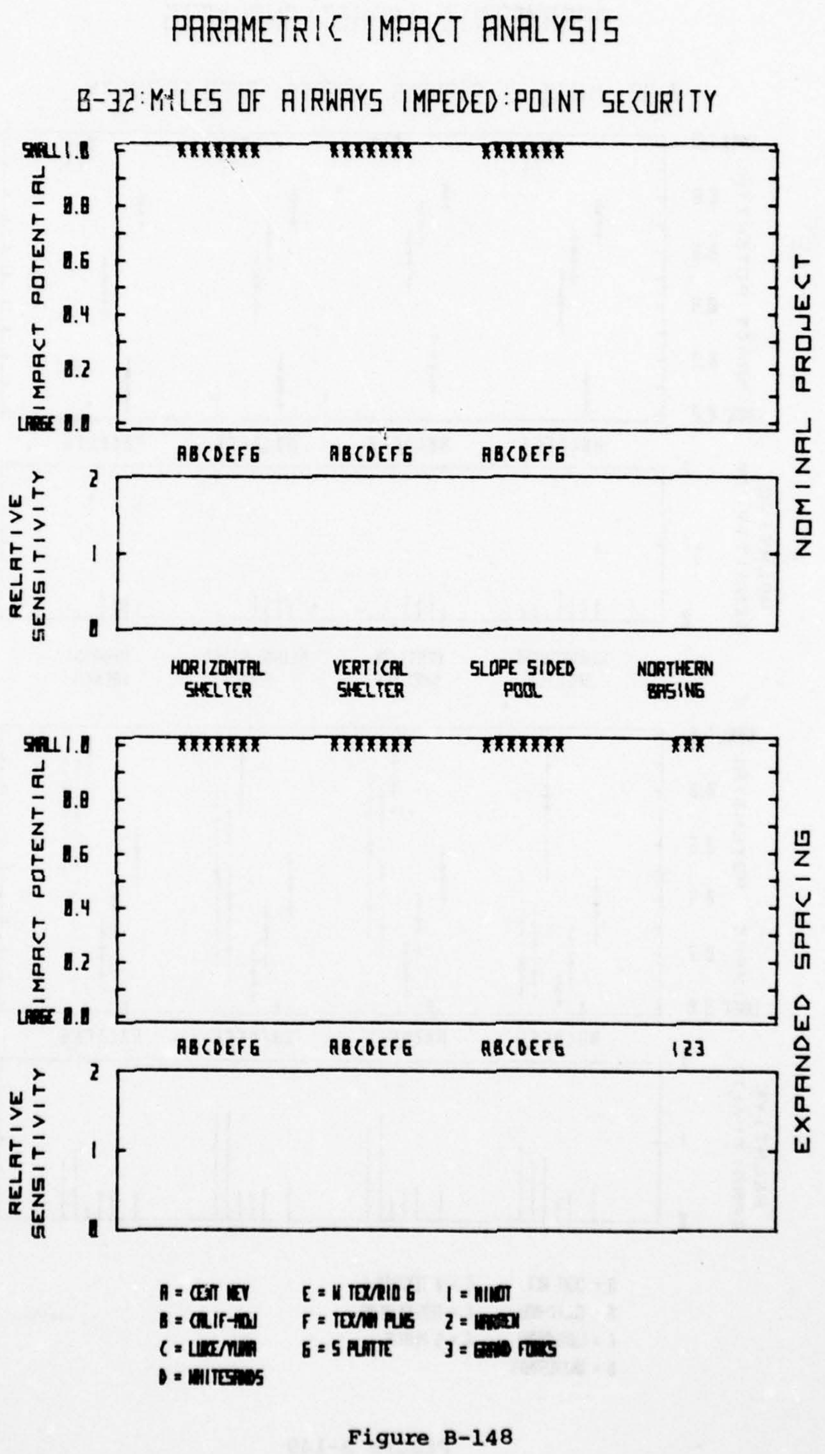

PARAMETRIC IMPACT ANALYSIS
B-32:MILES OF AIRWAYS IMPEDED:POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG ABCDEFG ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
ABCDEFG ABCDEFG ABCDEFG 123
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-148

PARAMETRIC IMPACT ANALYSIS

B-32 MILES OF AIRWAYS IMPEDED: AREA SECURITY

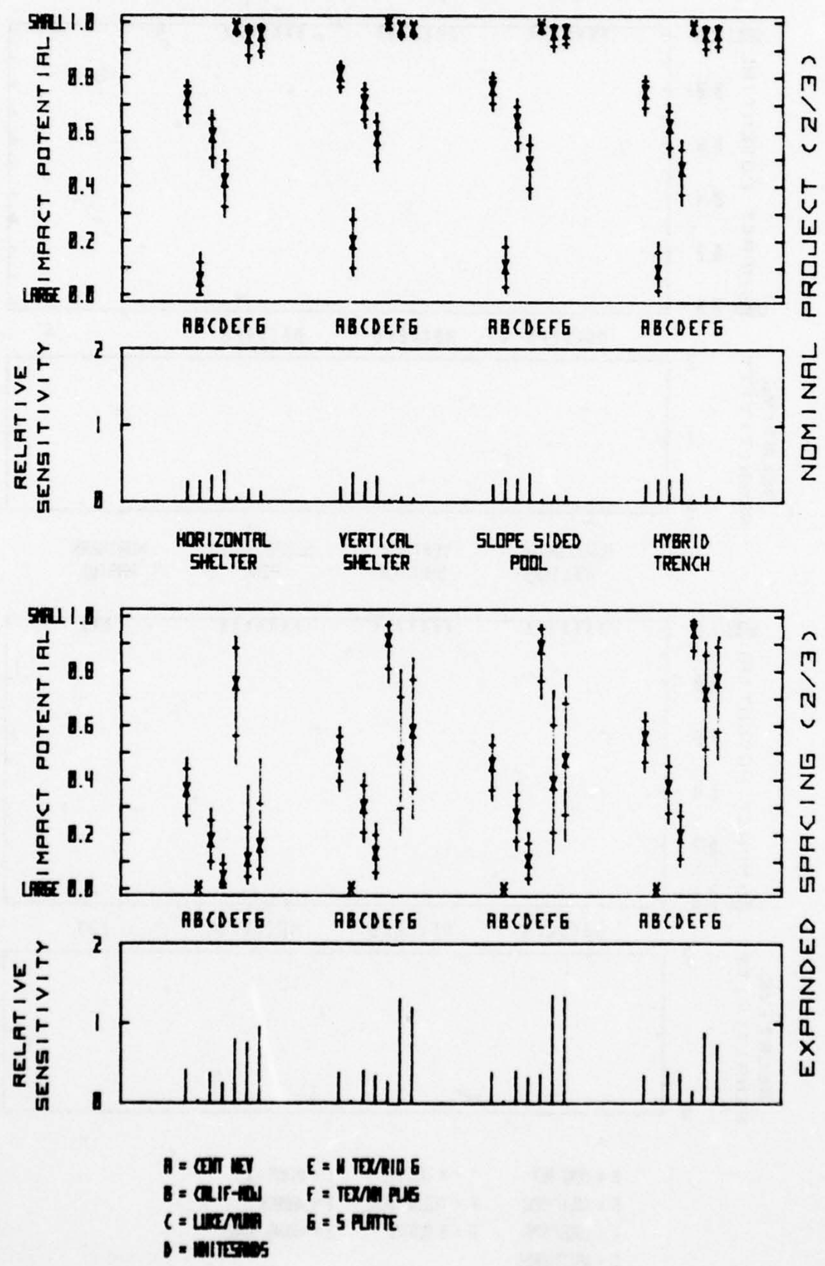
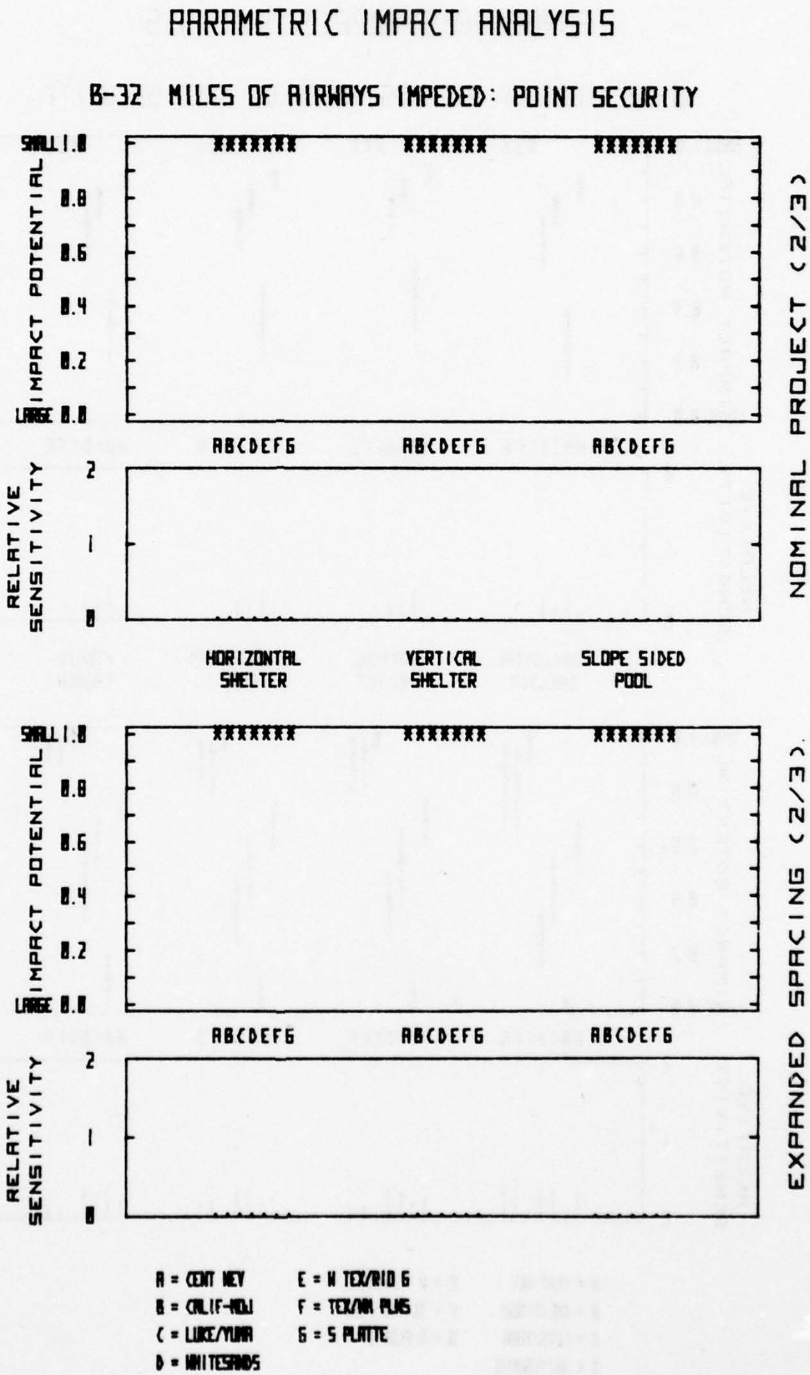


Figure B-149



PARAMETRIC IMPACT ANALYSIS
B-32 MILES OF AIRWAYS IMPEDED: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-150

PARAMETRIC IMPACT ANALYSIS

B-32 MILES OF AIRWAYS IMPEDED: AREA SECURITY

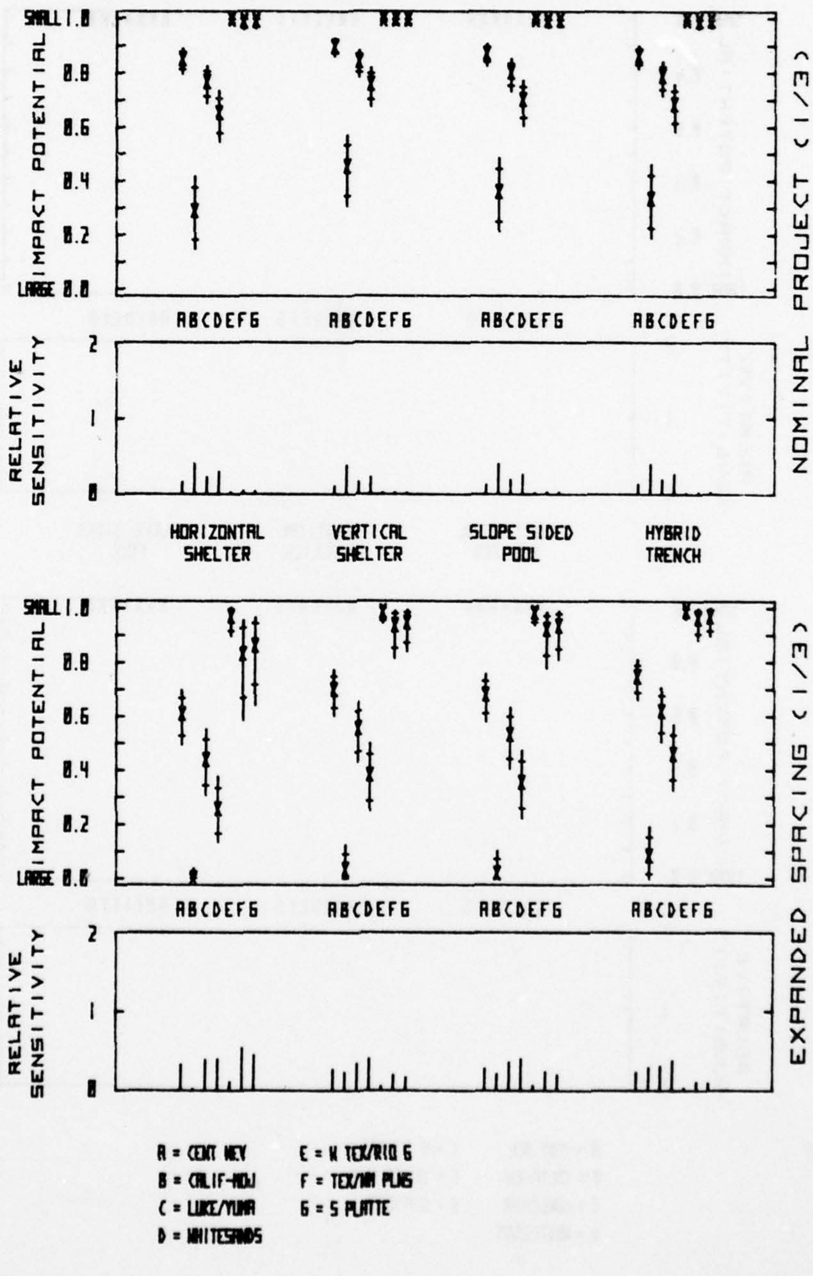


Figure B-151

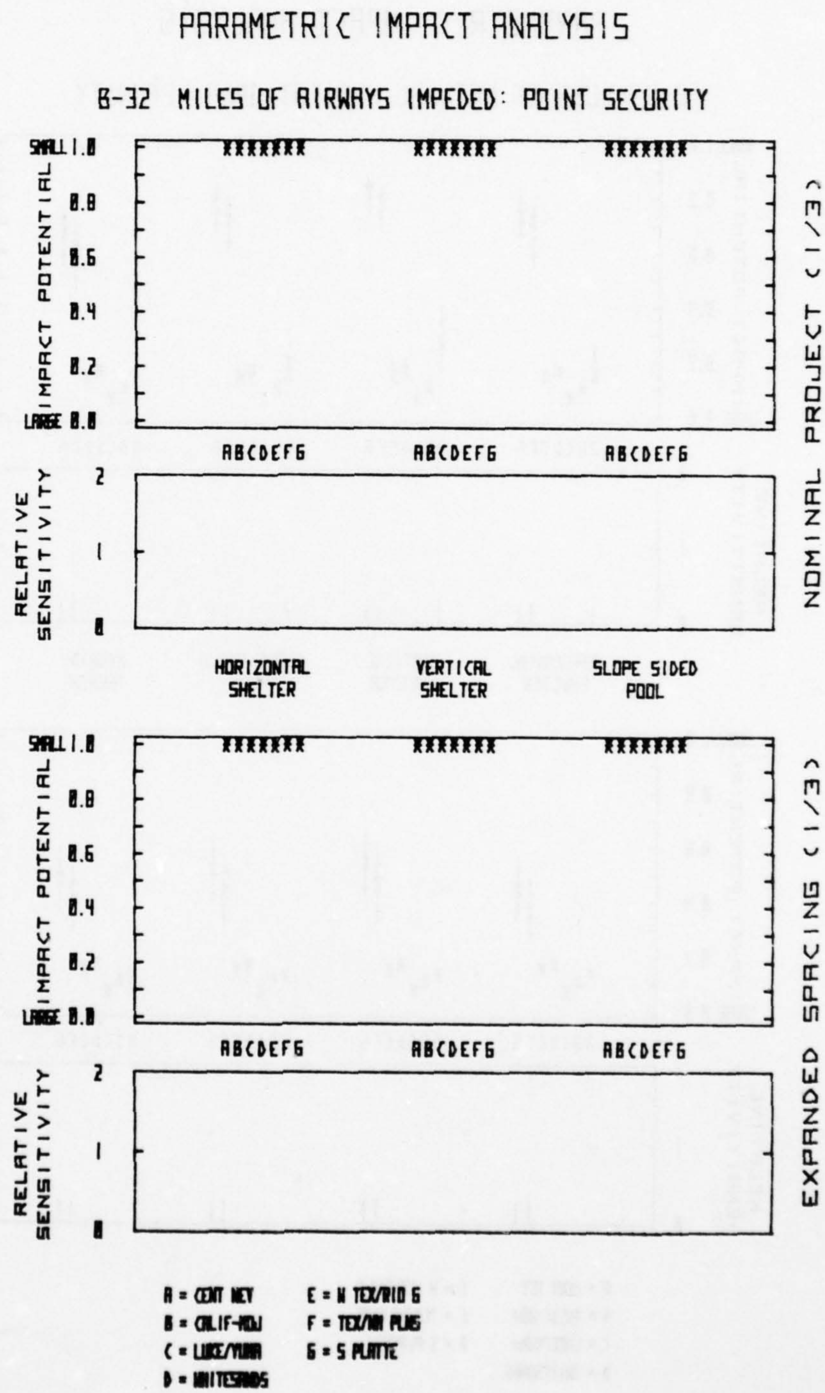

PARAMETRIC IMPACT ANALYSIS
B-32 MILES OF AIRWAYS IMPEDED: POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
XXXXXXX
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-152

PARAMETRIC IMPACT ANALYSIS

B-33: LOSS OF NATURAL HABITAT: AREA SECURITY

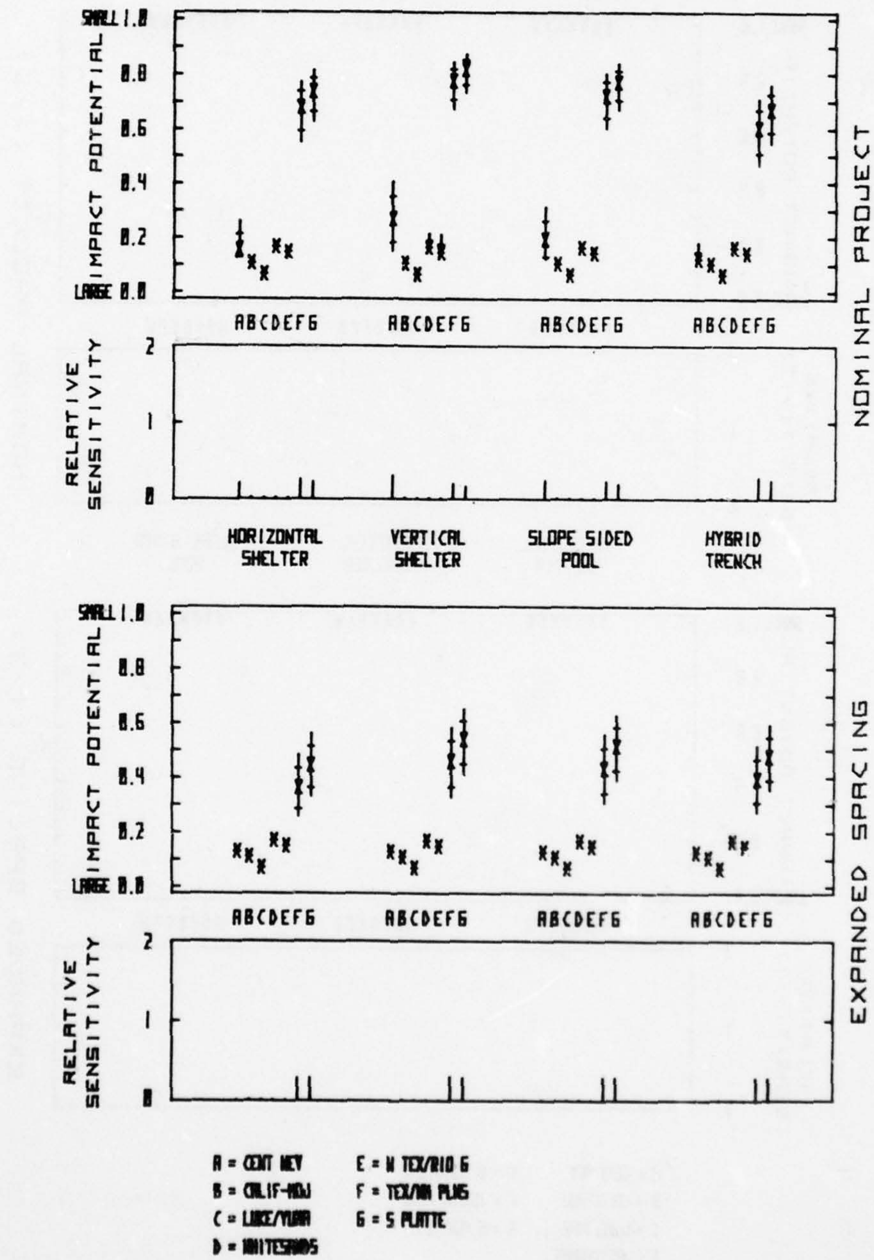


Figure B-153

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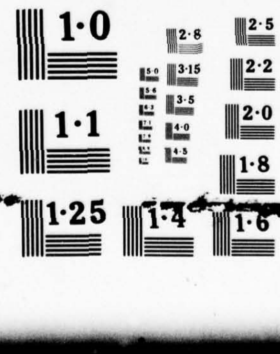
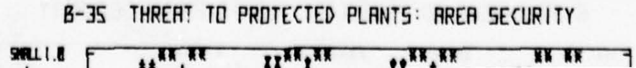


PARAMETRIC IMPACT ANALYSIS

B-35 THREAT TO PROTECTED PLANTS: AREA SECURITY



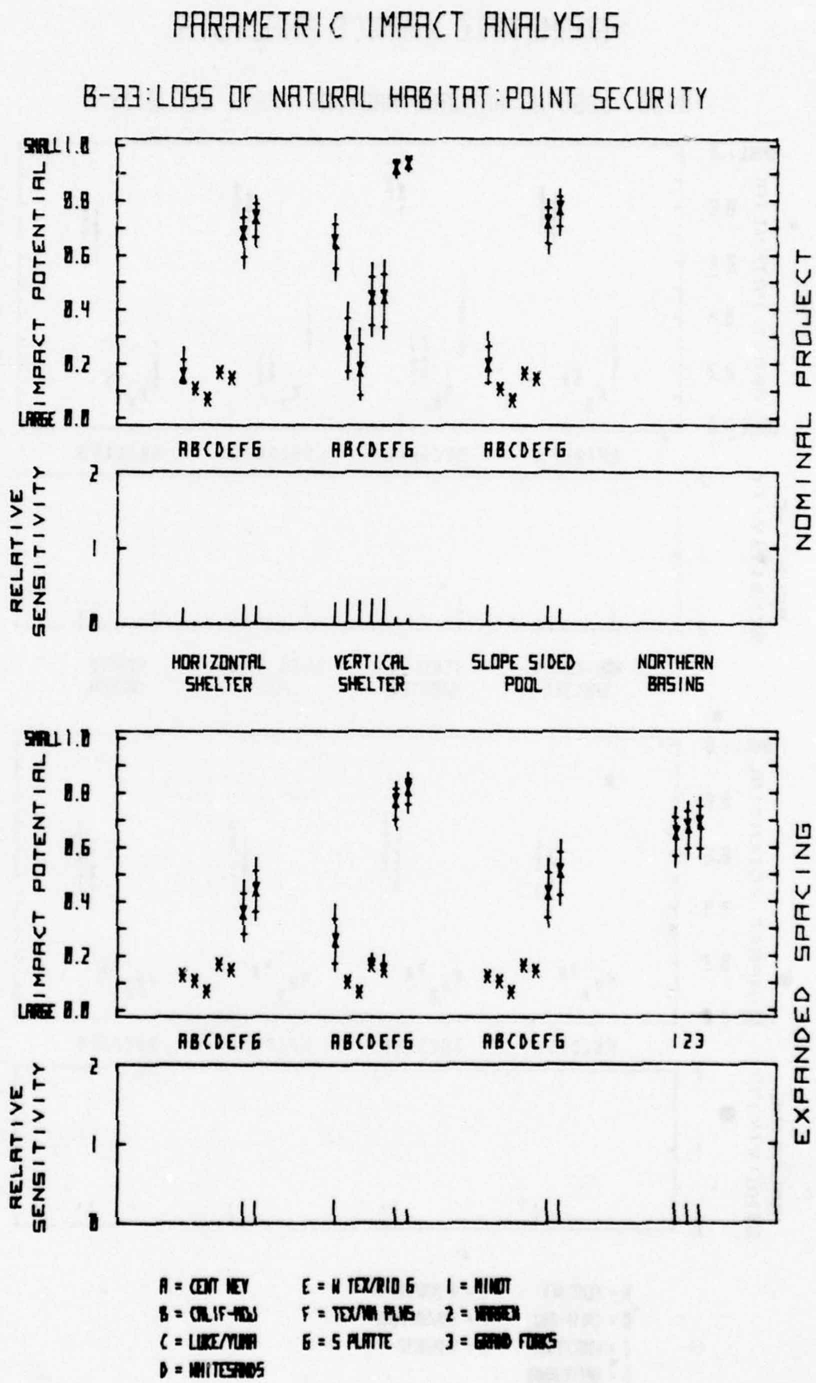

PARAMETRIC IMPACT ANALYSIS
B-33: LOSS OF NATURAL HABITAT: POINT SECURITY
SMALL
LARGE
IMPACT POTENTIAL
RELATIVE SENSITIVITY
ABCDEFG
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-154

PARAMETRIC IMPACT ANALYSIS

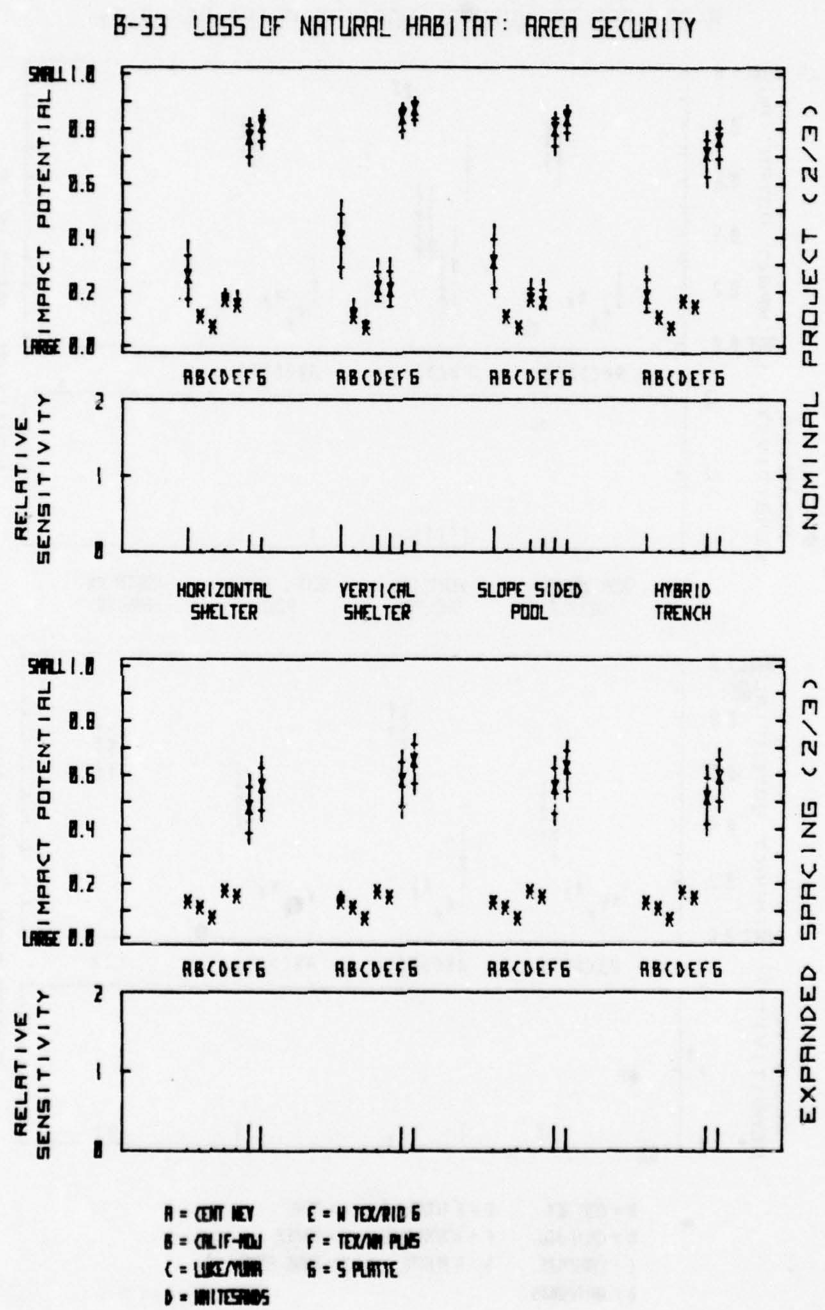


Figure B-155

PARAMETRIC IMPACT ANALYSIS

B-33 LOSS OF NATURAL HABITAT: POINT SECURITY

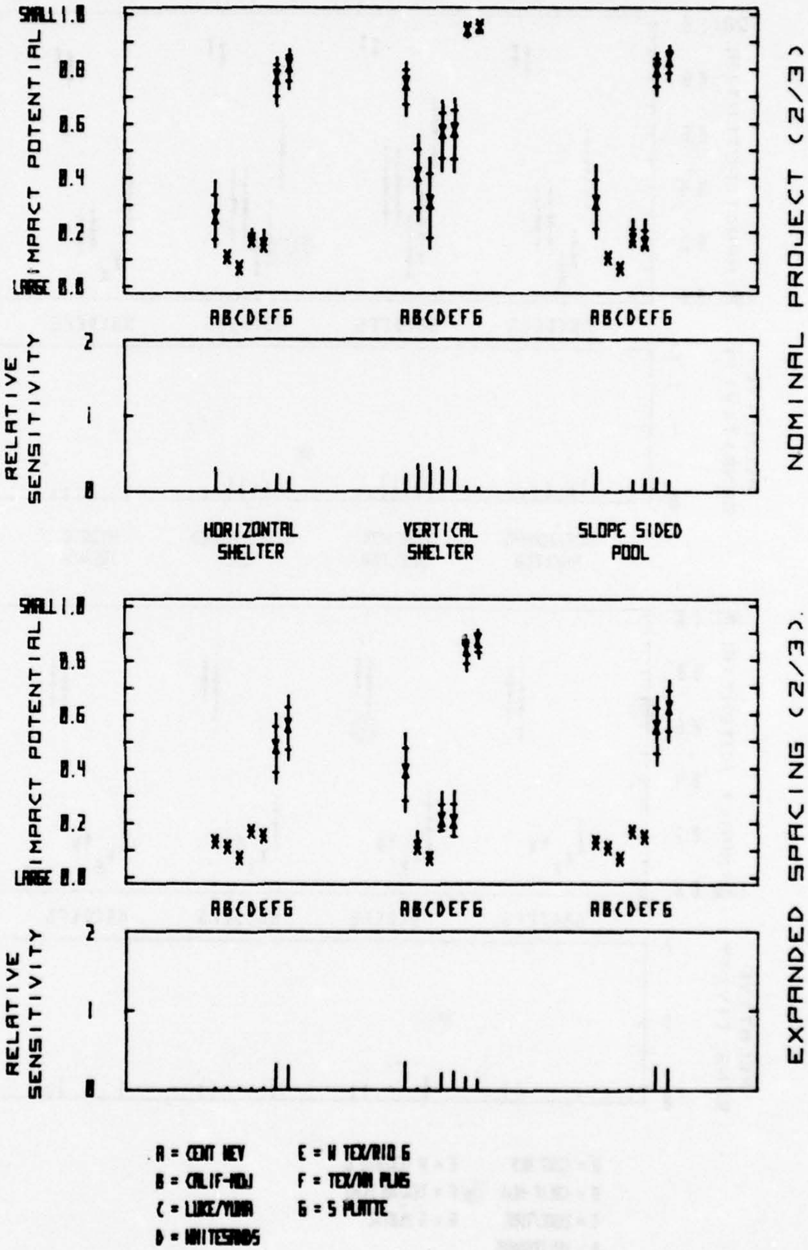


Figure B-156

PARAMETRIC IMPACT ANALYSIS

B-33 LOSS OF NATURAL HABITAT: AREA SECURITY

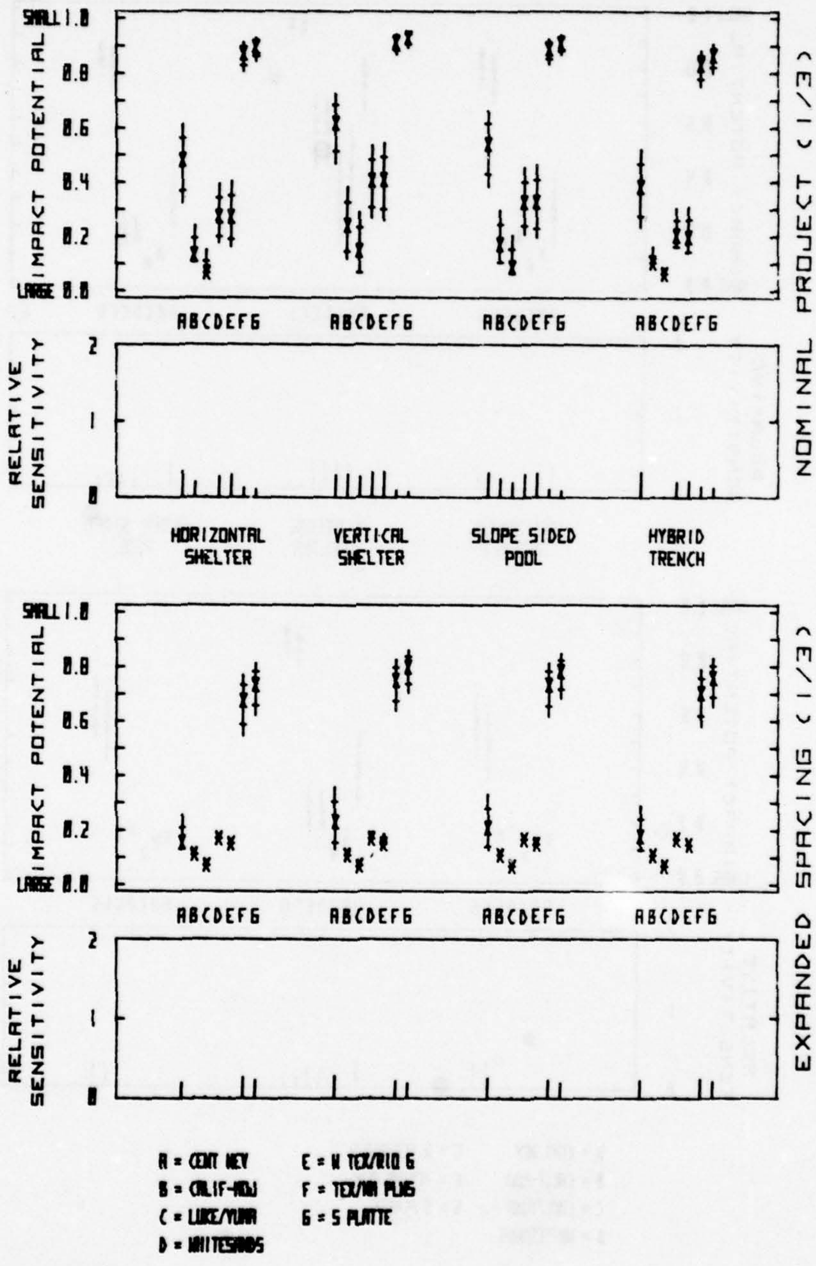


Figure B-157

PARAMETRIC IMPACT ANALYSIS

B-33 LOSS OF NATURAL HABITAT: POINT SECURITY

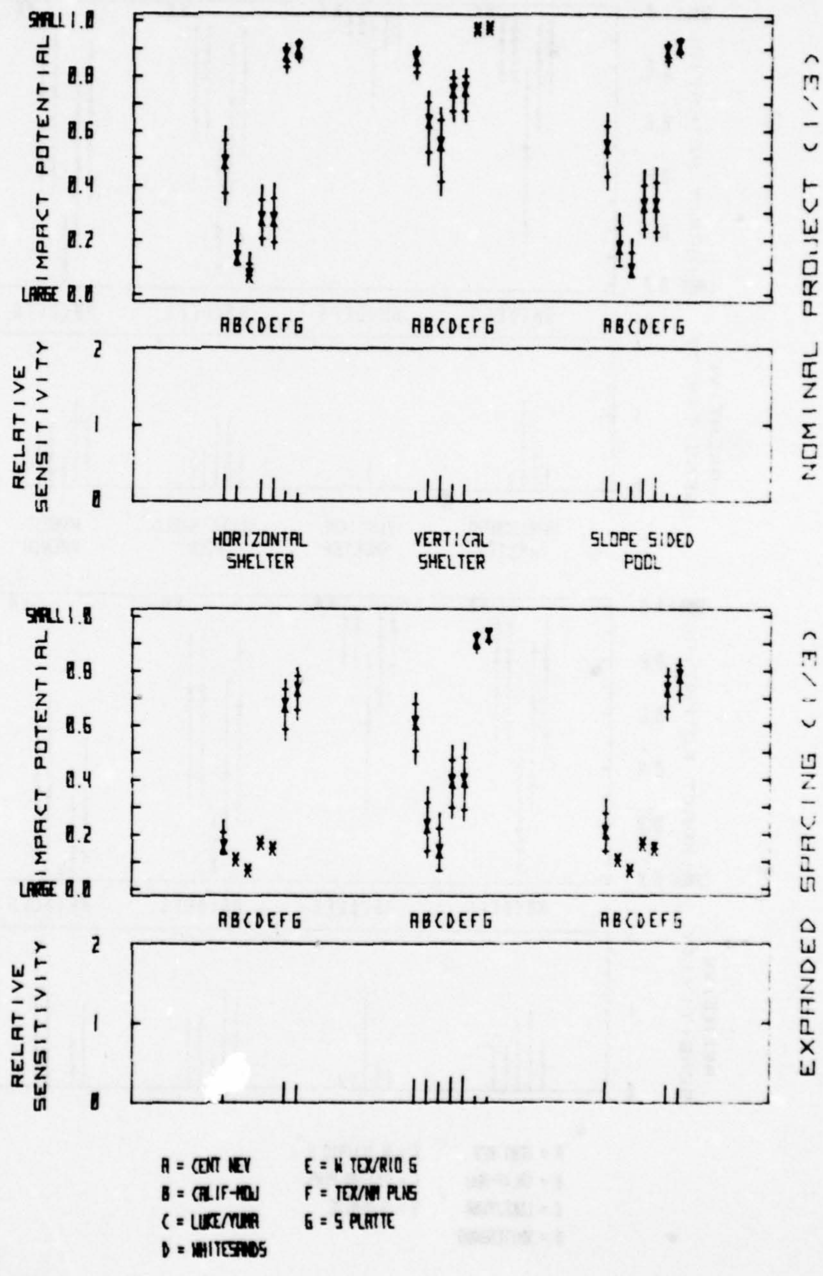
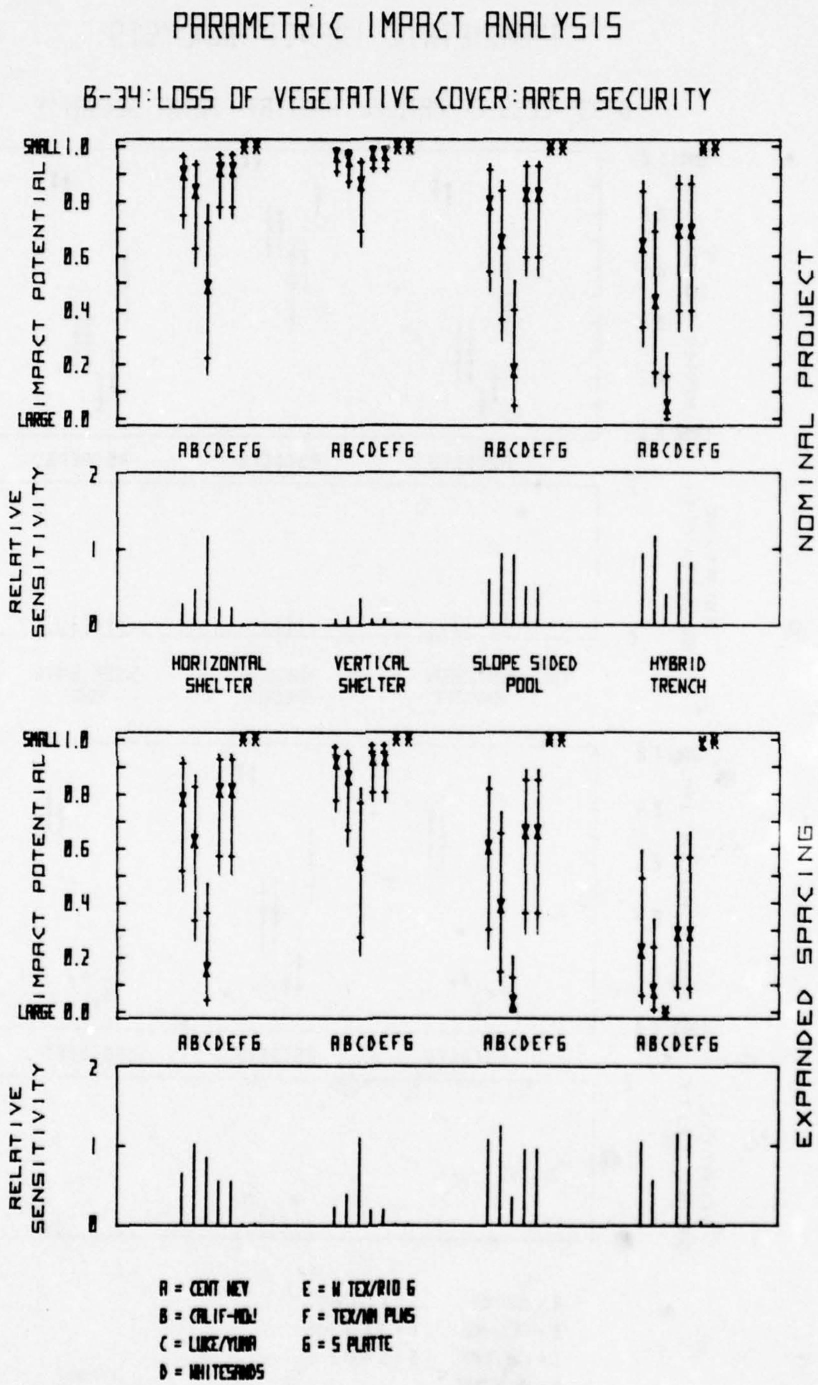


Figure B-158



PARAMETRIC IMPACT ANALYSIS
B-34: LOSS OF VEGETATIVE COVER: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-159

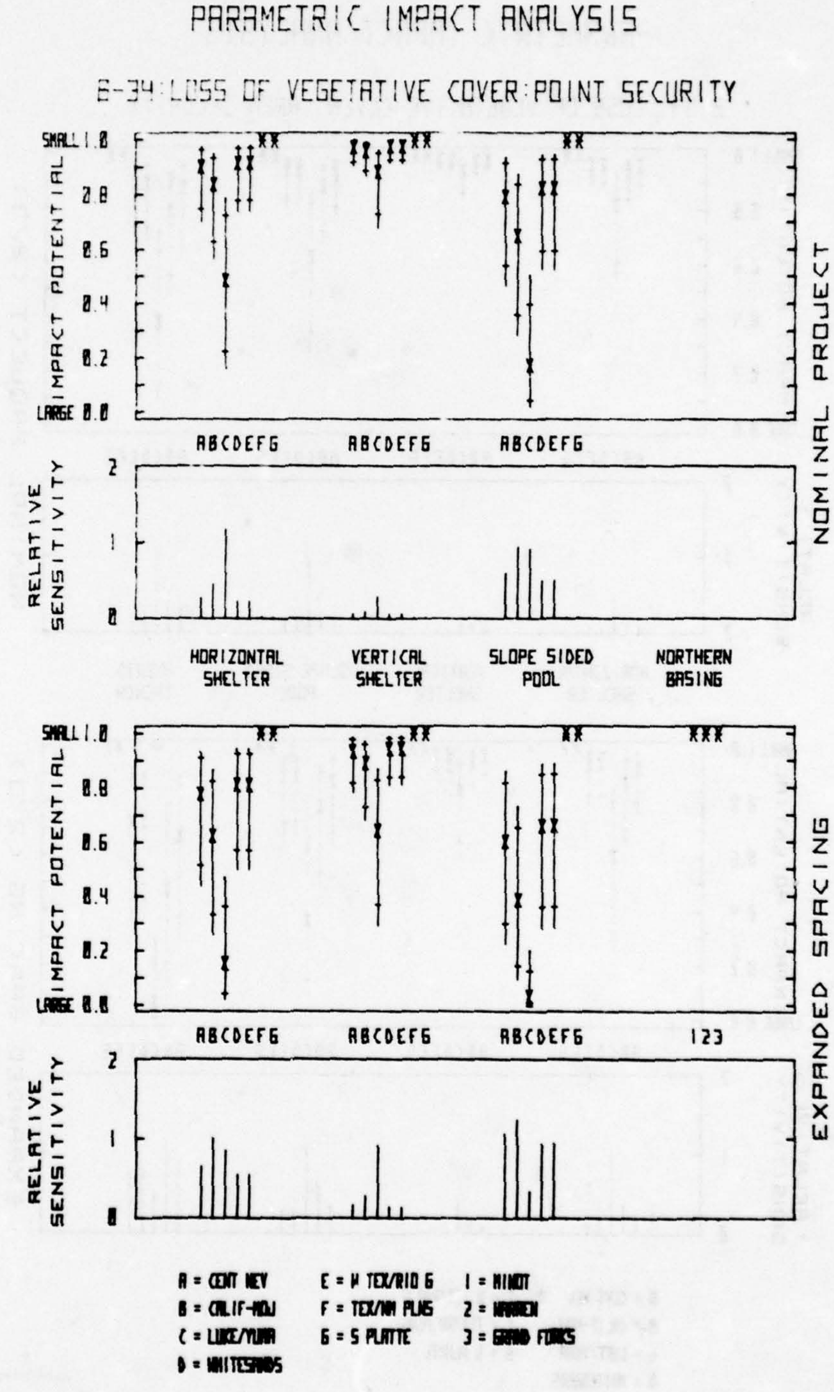

PARAMETRIC IMPACT ANALYSIS
B-34:LOSS OF VEGETATIVE COVER:POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
NOMINAL PROJECT
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-160

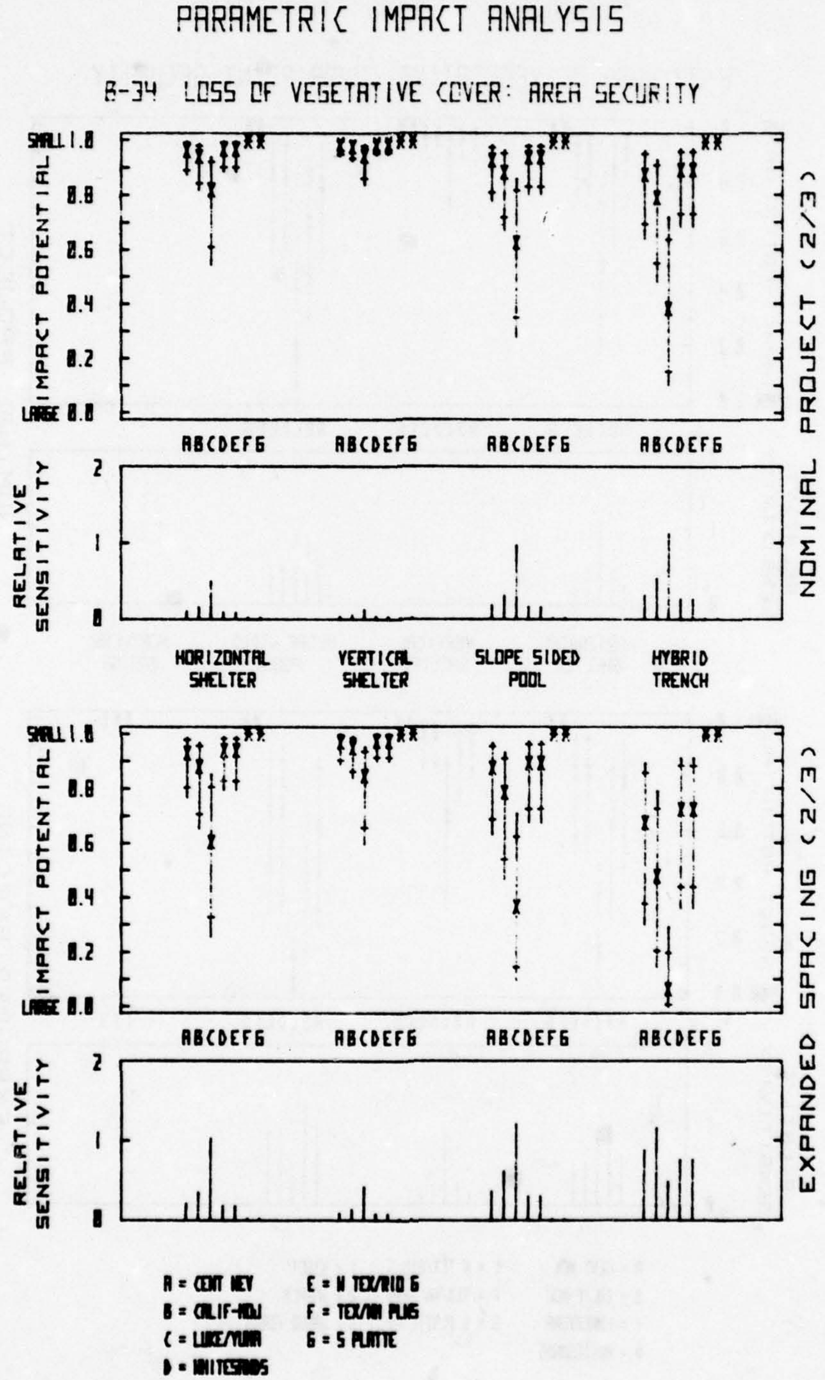

PARAMETRIC IMPACT ANALYSIS
B-34 LOSS OF VEGETATIVE COVER: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (2/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-161

PARAMETRIC IMPACT ANALYSIS

B-34 LOSS OF VEGETATIVE COVER: POINT SECURITY

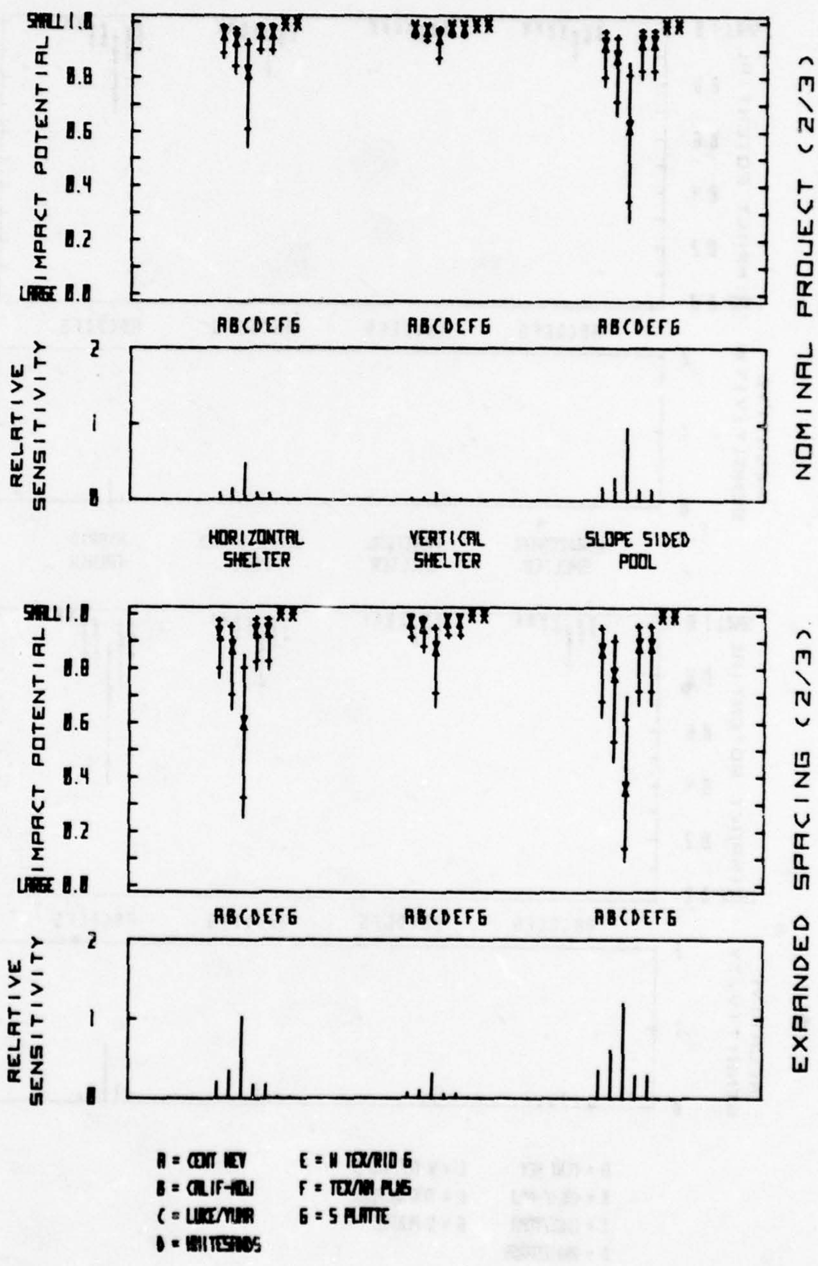


Figure B-162

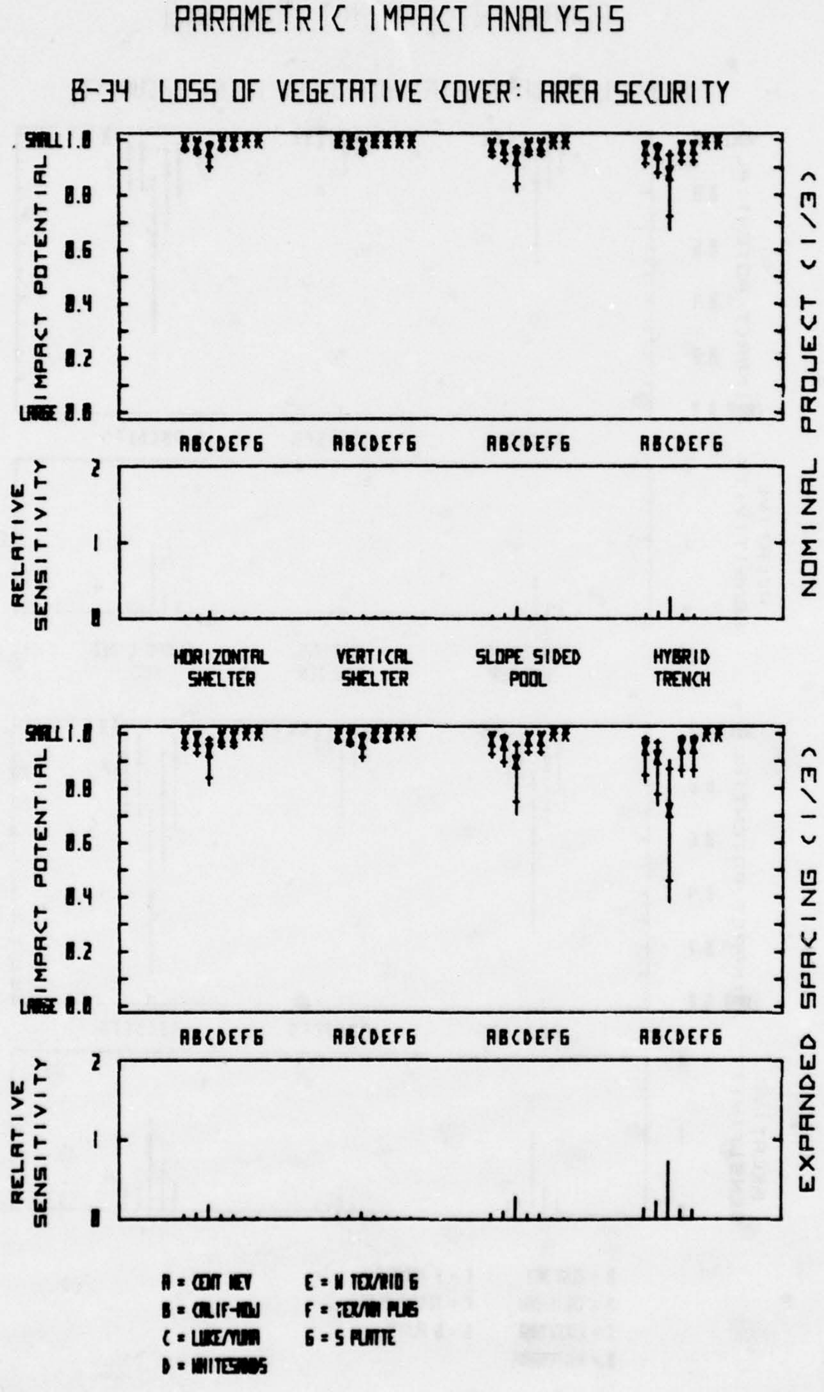

PARAMETRIC IMPACT ANALYSIS
B-34 LOSS OF VEGETATIVE COVER: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-163

PARAMETRIC IMPACT ANALYSIS

B-34 LOSS OF VEGETATIVE COVER: POINT SECURITY

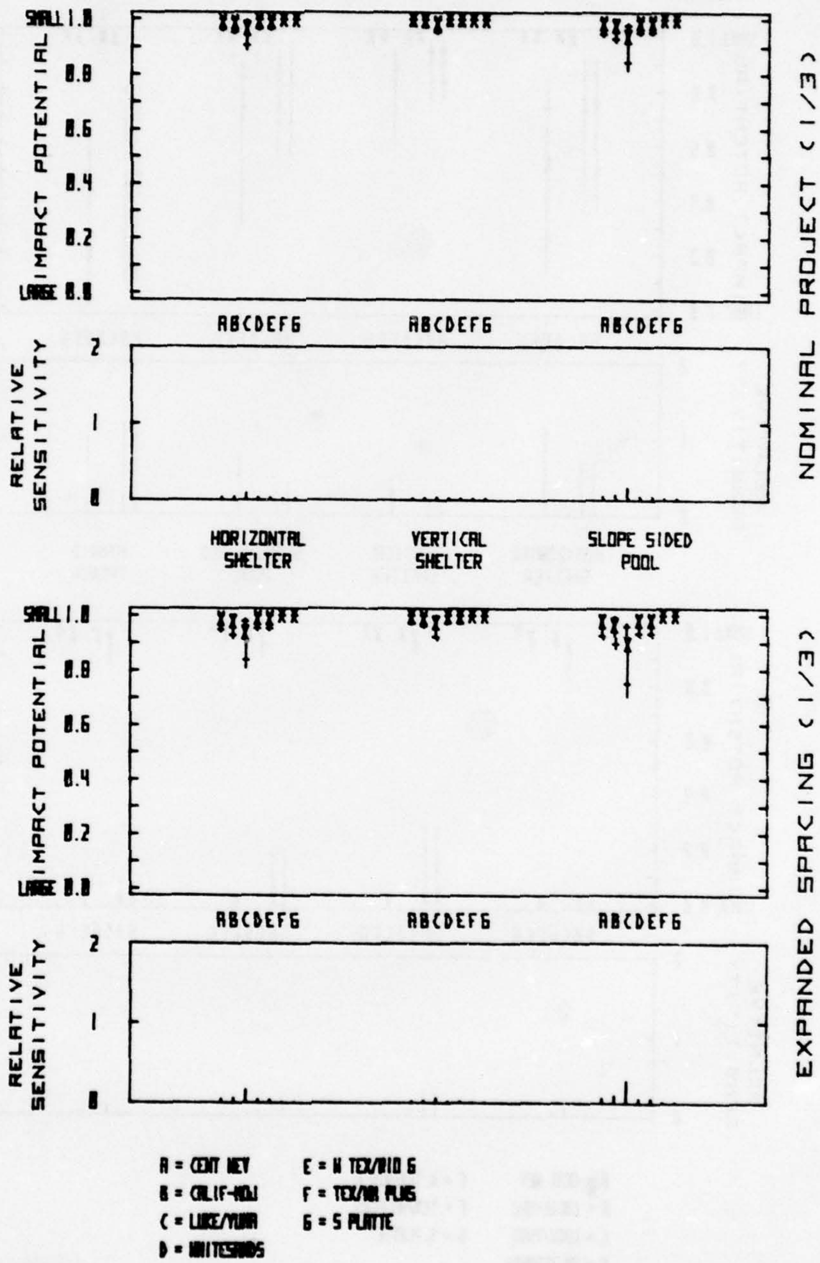


Figure B-164

PARAMETRIC IMPACT ANALYSIS

B-35: THREAT TO PROTECTED PLANTS: AREA SECURITY

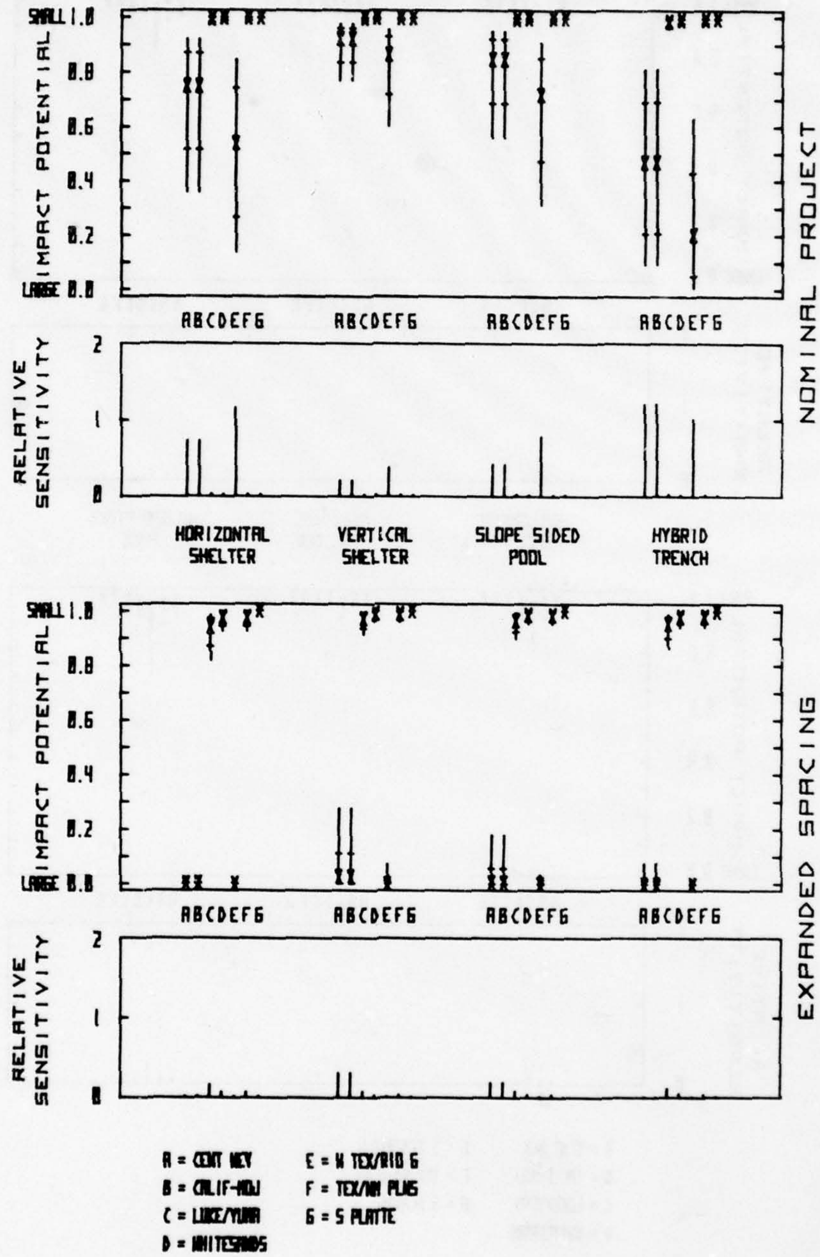


Figure B-165

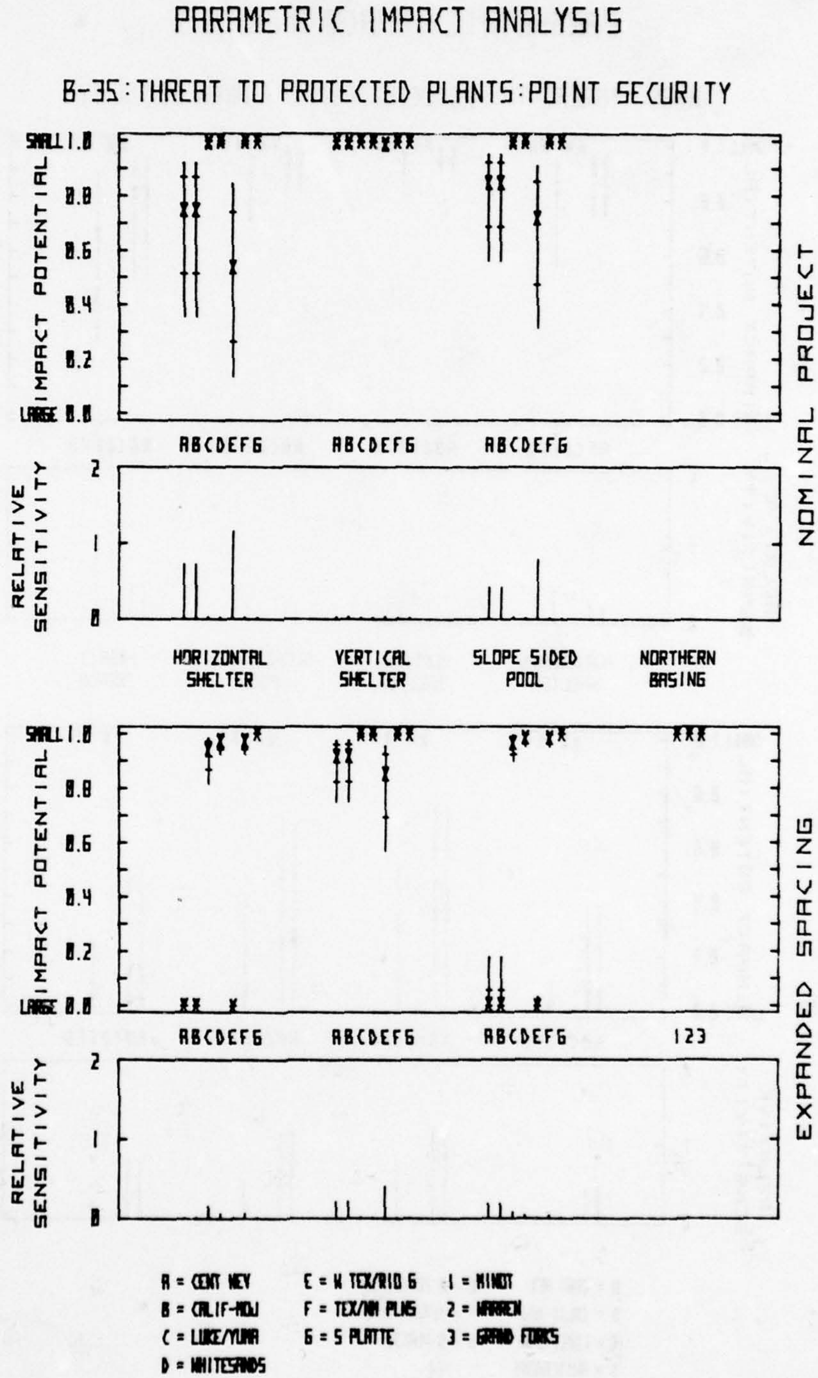

PARAMETRIC IMPACT ANALYSIS
B-35: THREAT TO PROTECTED PLANTS: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
NOMINAL PROJECT
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-166

PARAMETRIC IMPACT ANALYSIS

B-35 THREAT TO PROTECTED PLANTS: AREA SECURITY

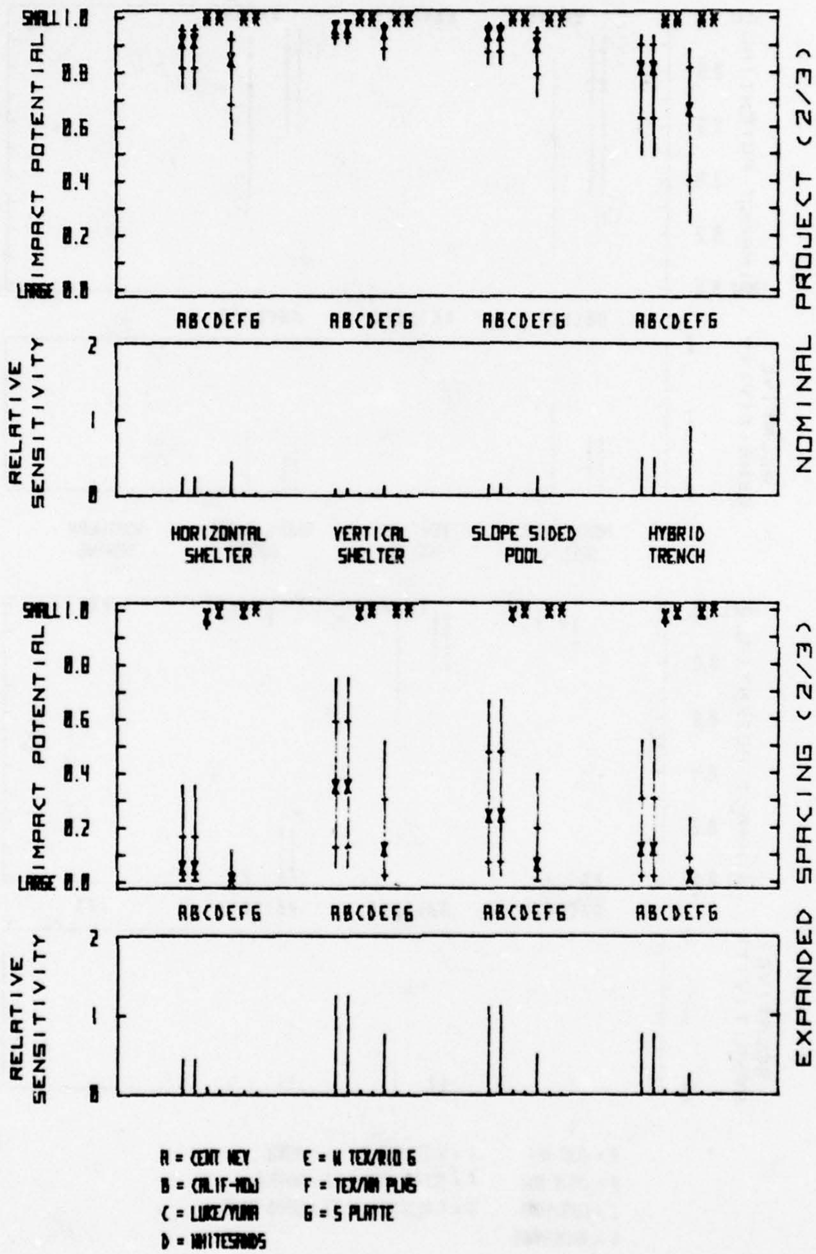
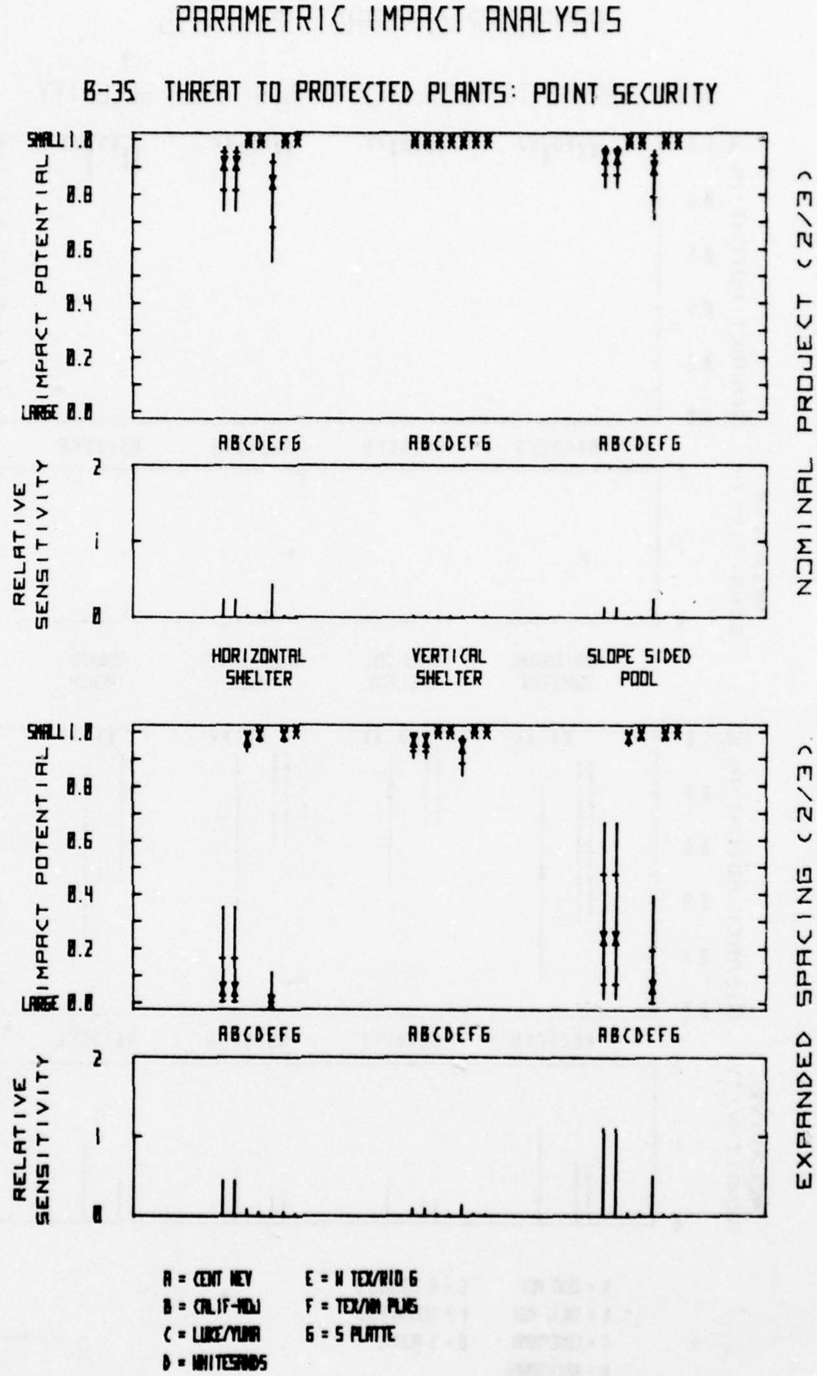


Figure B-167



PARAMETRIC IMPACT ANALYSIS
B-35 THREAT TO PROTECTED PLANTS: POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
2
1
0
RELATIVE SENSITIVITY
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-168

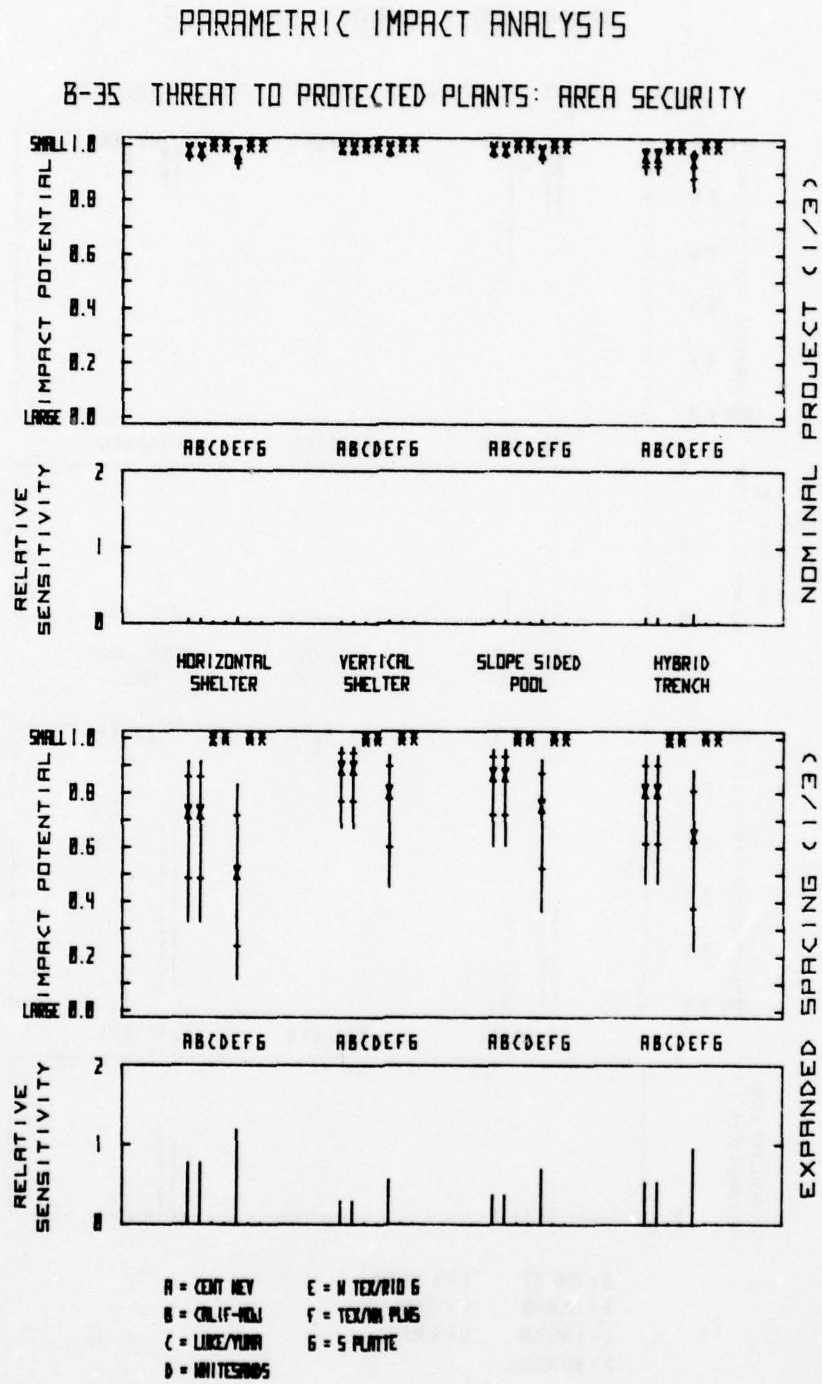

PARAMETRIC IMPACT ANALYSIS
B-35 THREAT TO PROTECTED PLANTS: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-169

PARAMETRIC IMPACT ANALYSIS

B-35 THREAT TO PROTECTED PLANTS: POINT SECURITY

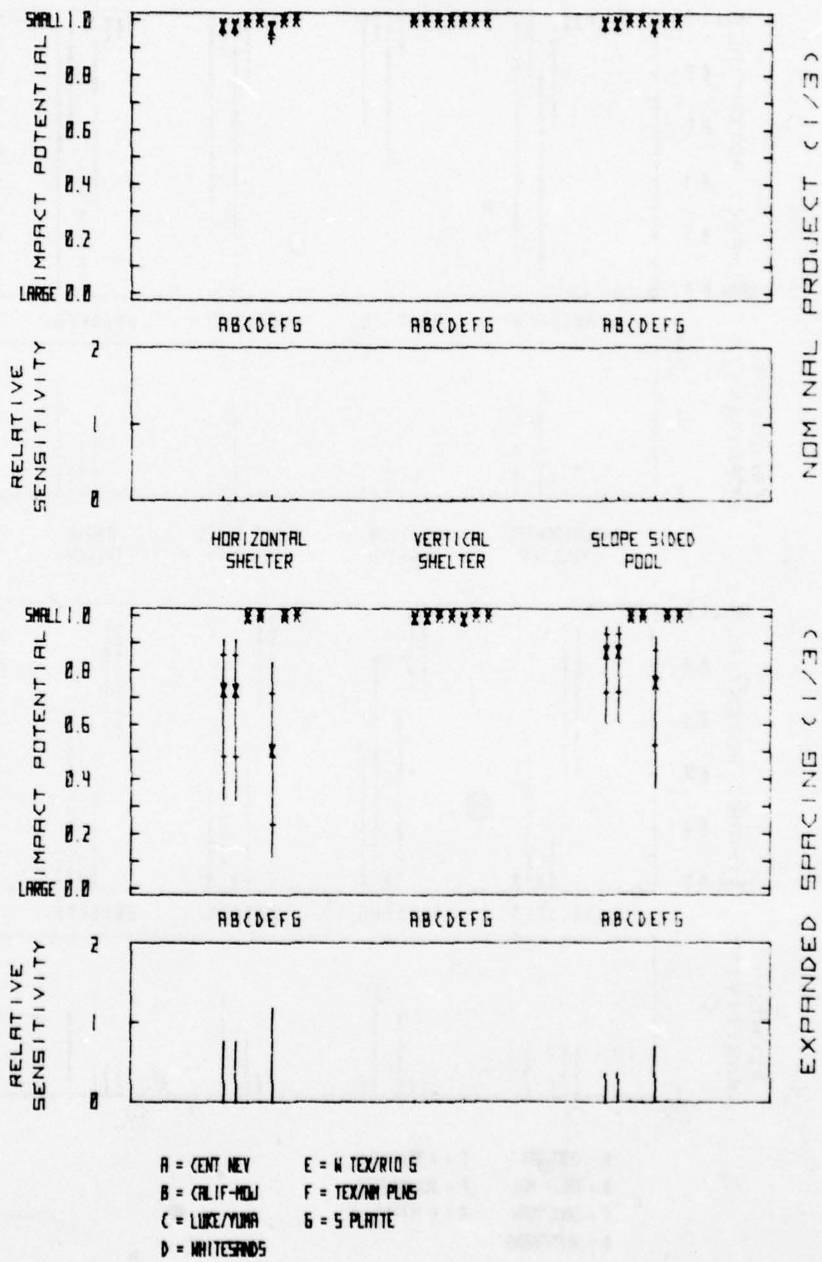


Figure B-170

PARAMETRIC IMPACT ANALYSIS

B-36: THREAT TO PROTECTED SMALL ANIMALS: AREA SECURITY

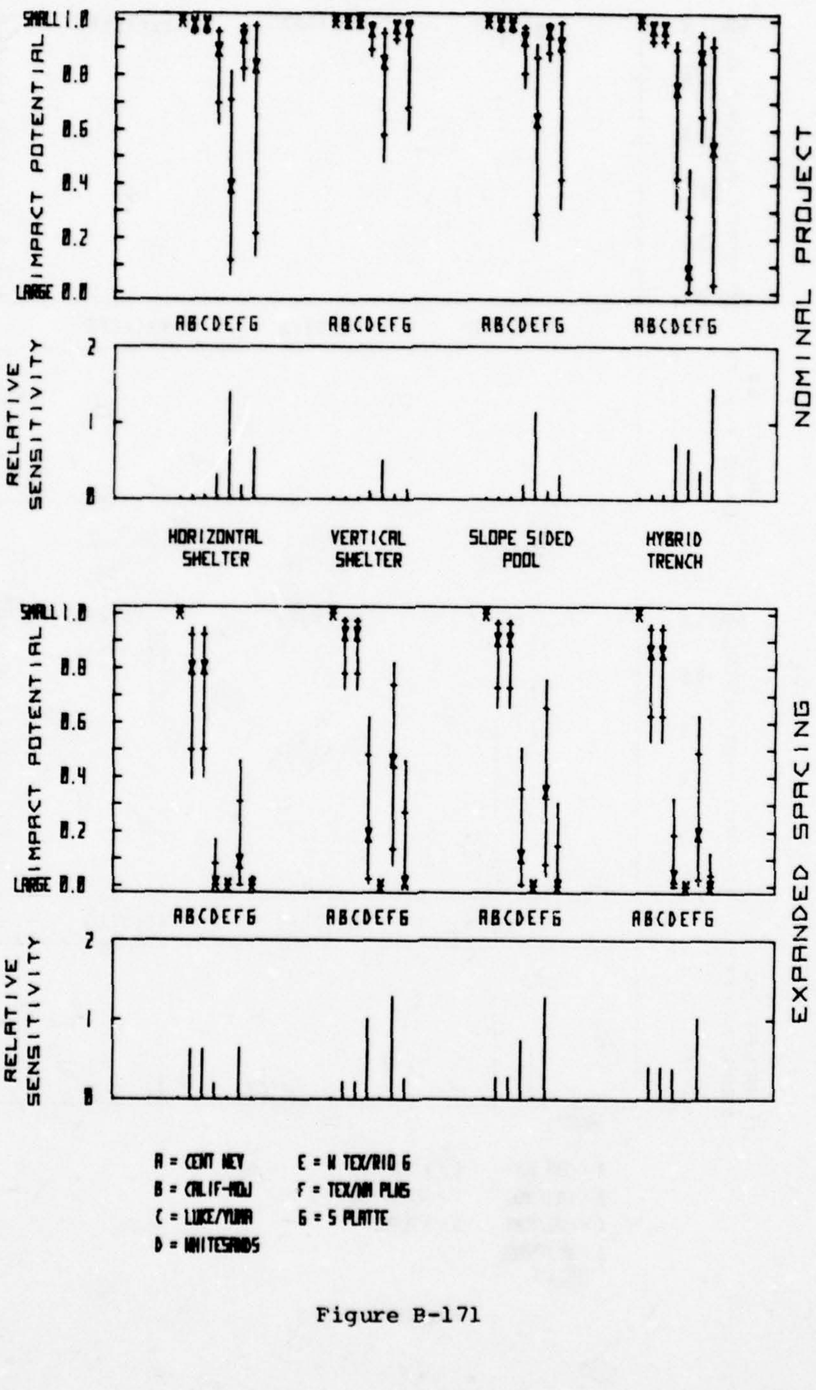


Figure B-171

PARAMETRIC IMPACT ANALYSIS

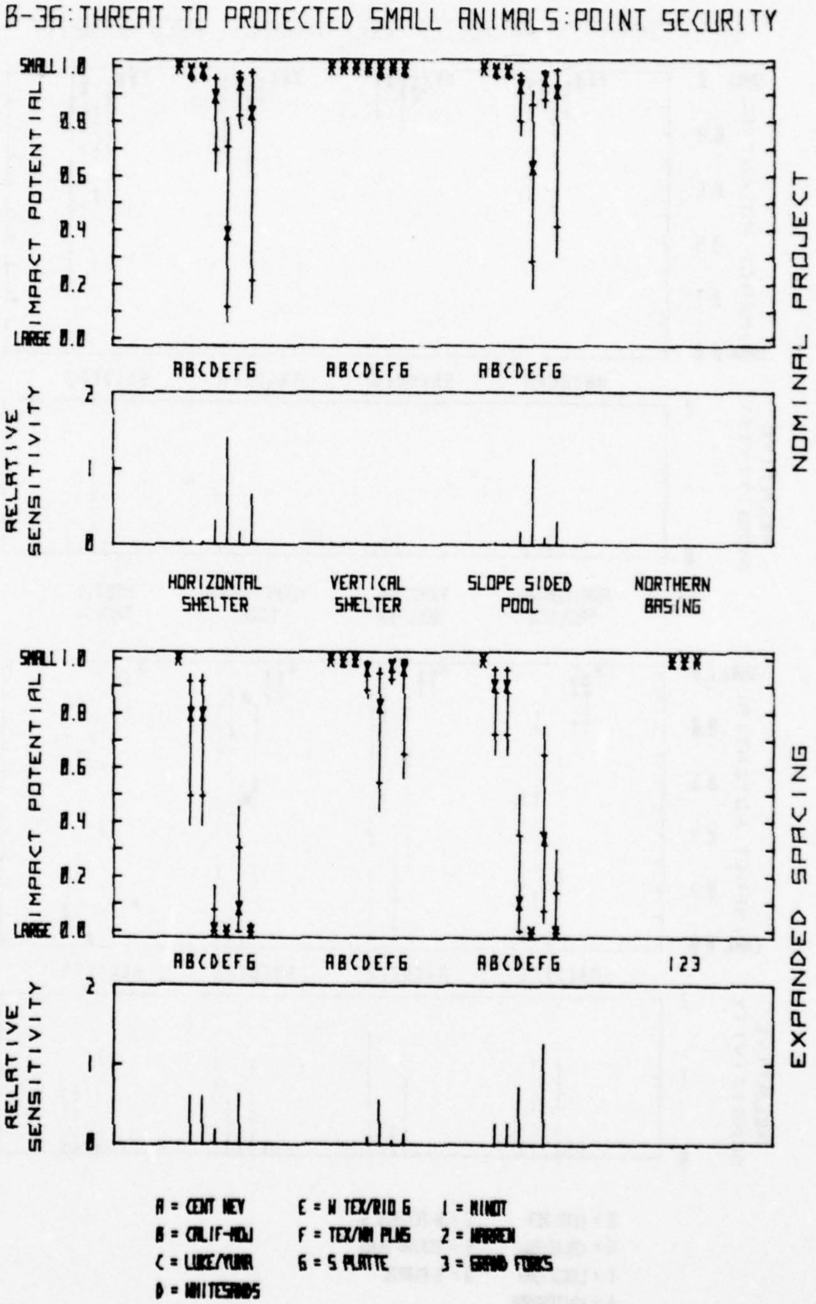


Figure B-172

PARAMETRIC IMPACT ANALYSIS

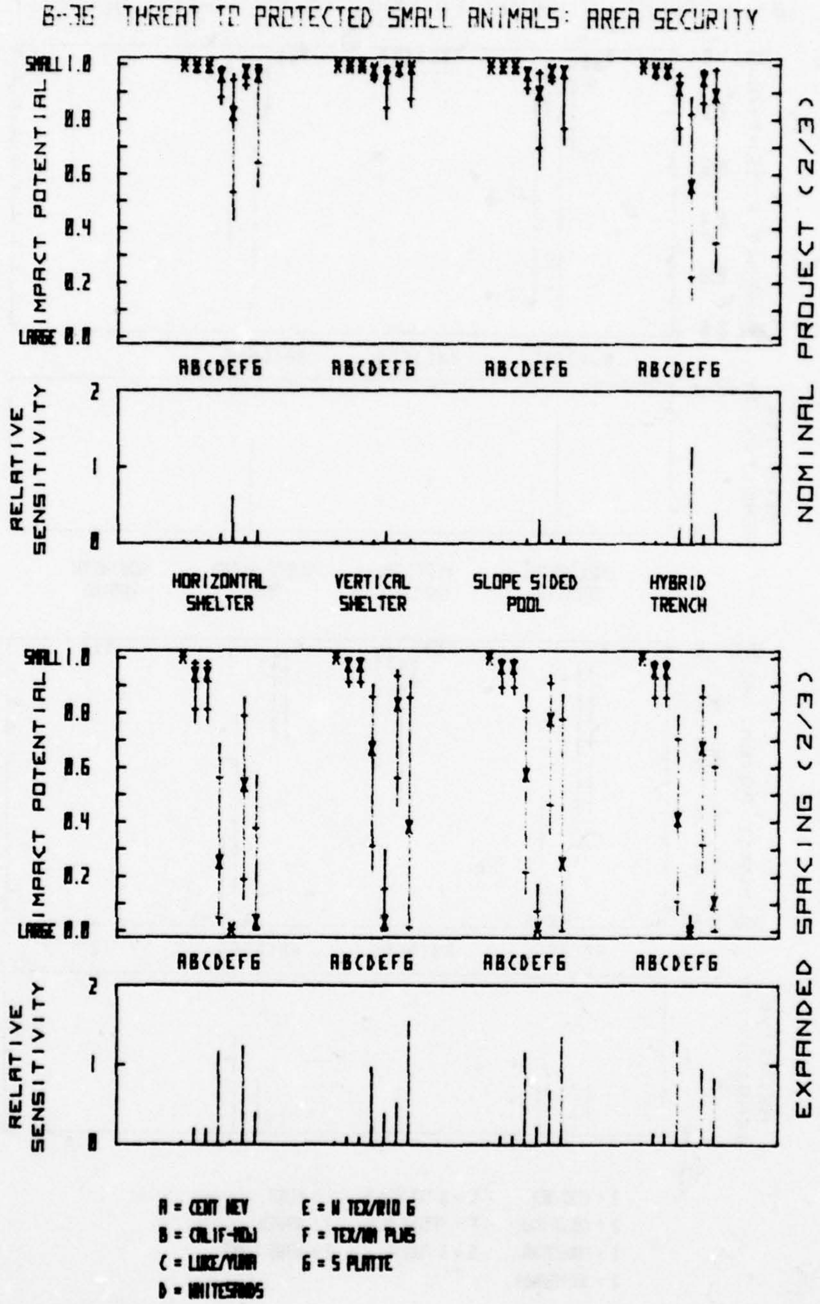


Figure B-173

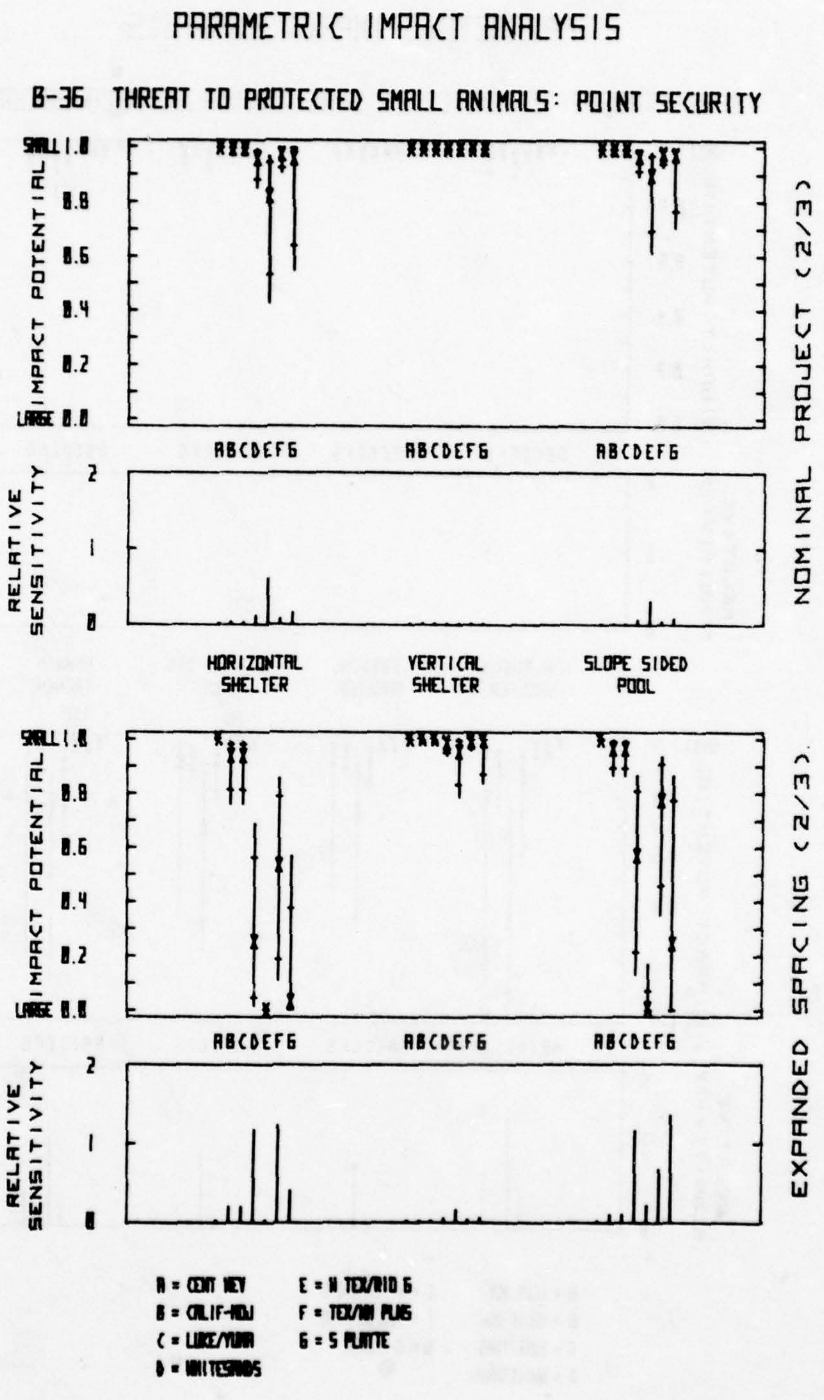

PARAMETRIC IMPACT ANALYSIS
B-36 THREAT TO PROTECTED SMALL ANIMALS: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-174

PARAMETRIC IMPACT ANALYSIS

B-36 THREAT TO PROTECTED SMALL ANIMALS: AREA SECURITY

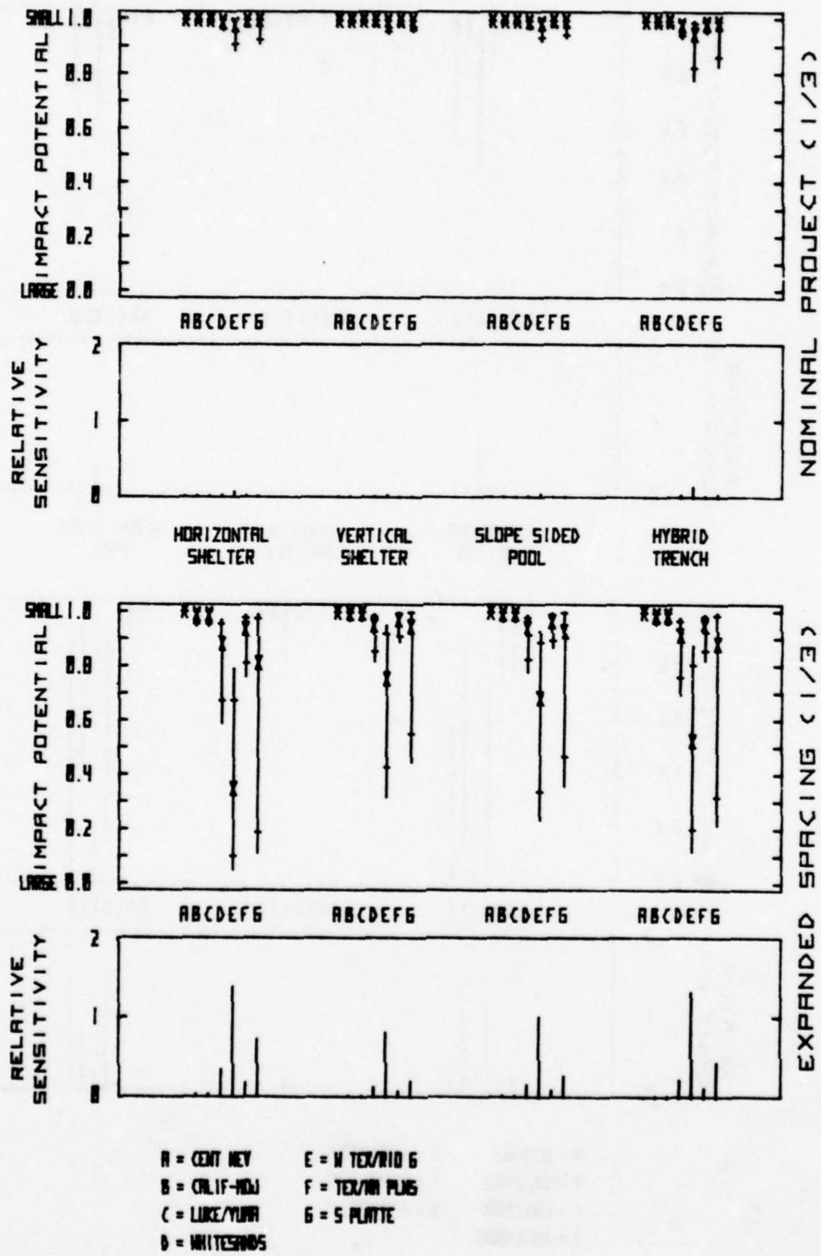


Figure B-175

PARAMETRIC IMPACT ANALYSIS

B-36 THREAT TO PROTECTED SMALL ANIMALS: POINT SECURITY

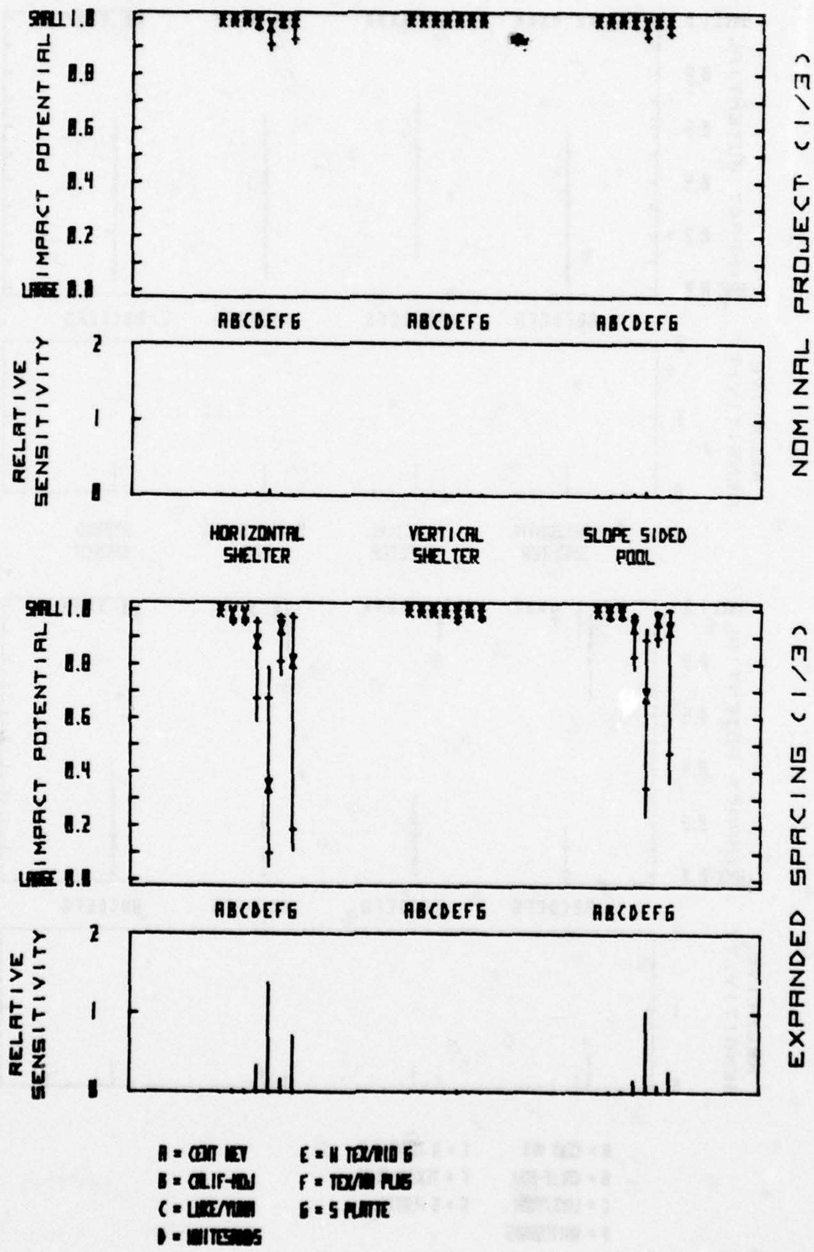


Figure B-176

PARAMETRIC IMPACT ANALYSIS

B-37: INTERFERENCE WITH LARGE MAMMALS BY FENCING: AREA SECURITY

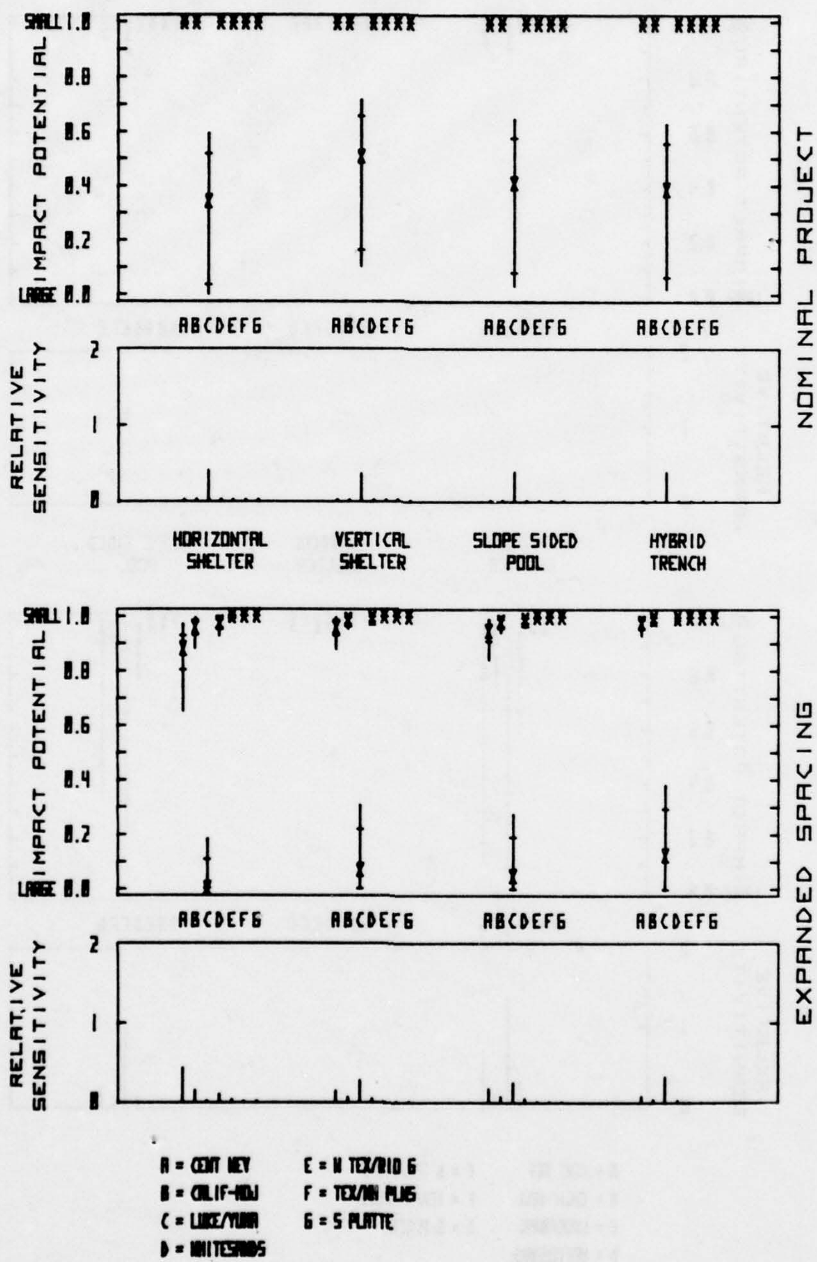


Figure B-177

PARAMETRIC IMPACT ANALYSIS

B-37: INTERFERENCE WITH LARGE MAMMALS BY FENCING: POINT SECURITY

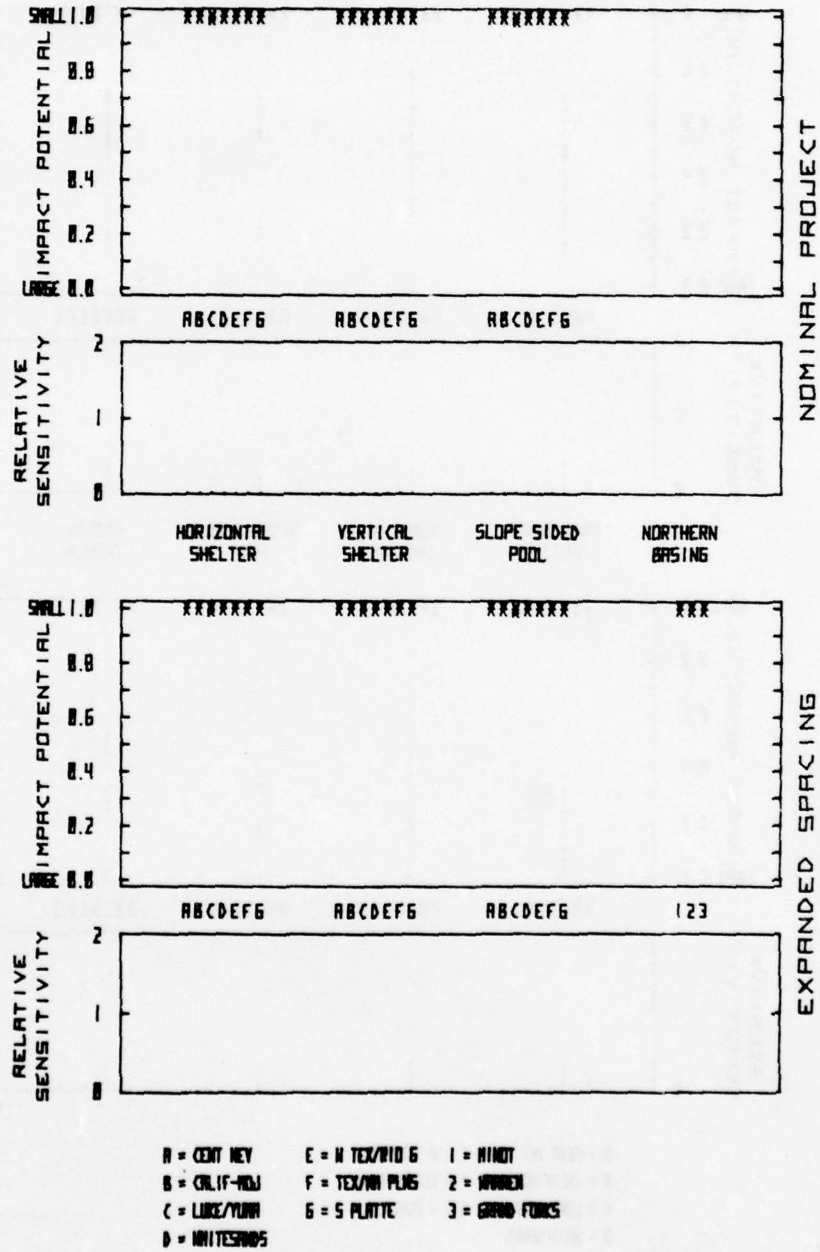


Figure B-178

PARAMETRIC IMPACT ANALYSIS

B-37 INTERFERENCE WITH LARGE MAMMALS BY FENCING: AREA SECURITY

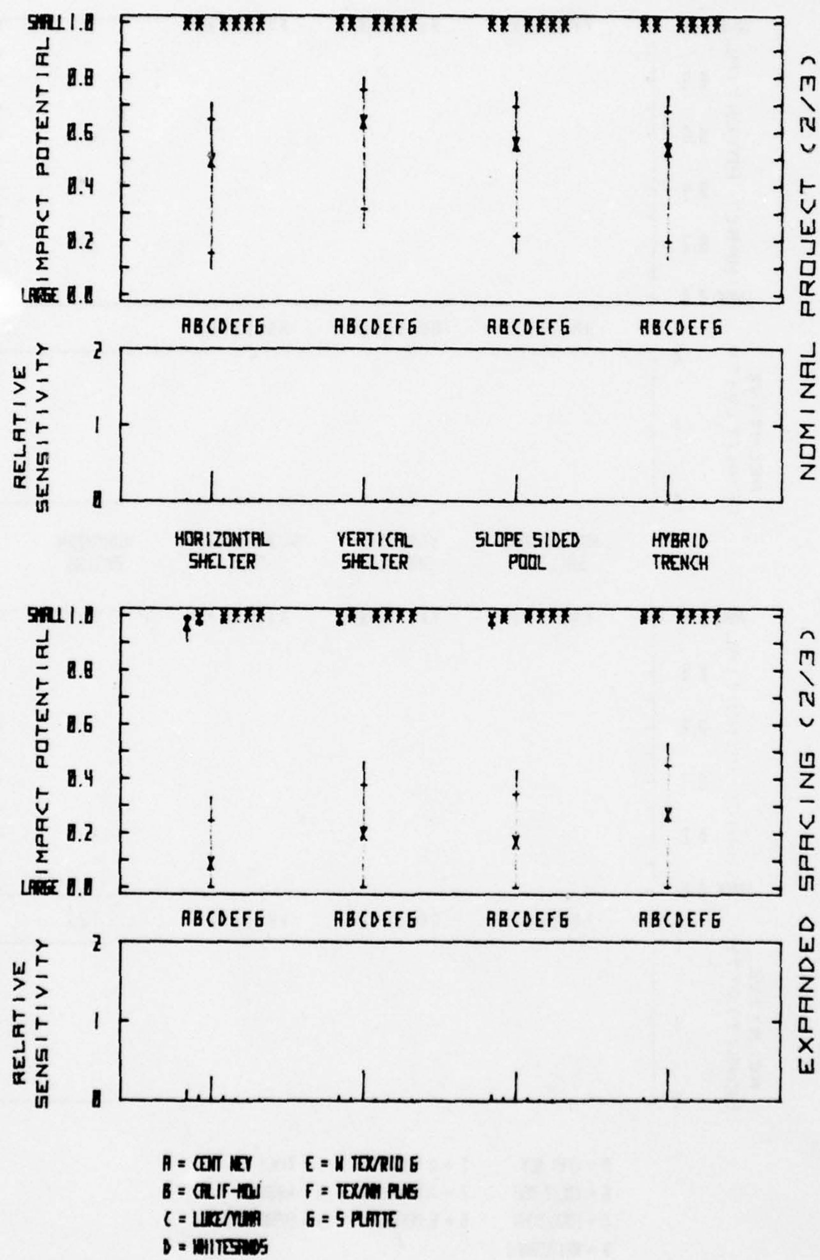


Figure B-179

PARAMETRIC IMPACT ANALYSIS

B-37 INTERFERENCE WITH LARGE MAMMALS BY FENCING: POINT SECURITY

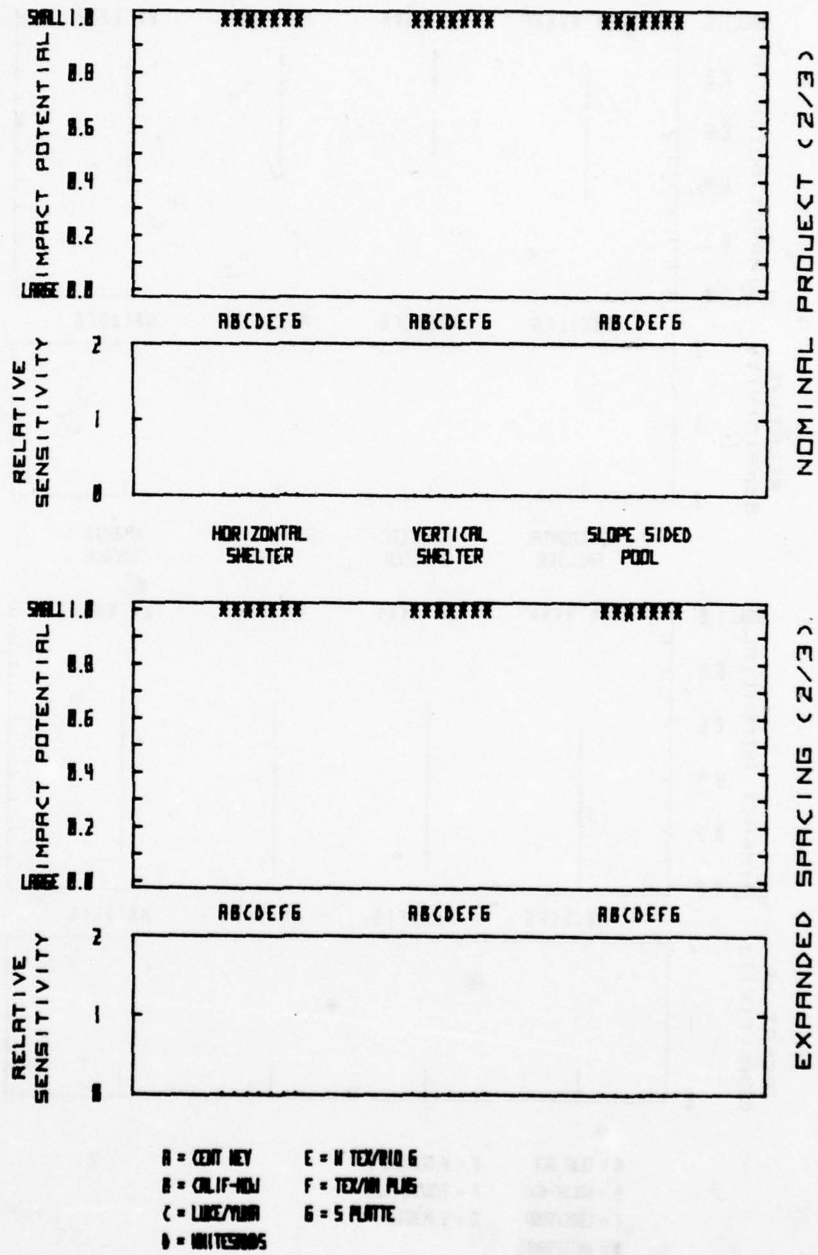


Figure B-180

PARAMETRIC IMPACT ANALYSIS

B-37 INTERFERENCE WITH LARGE MAMMALS BY FENCING: AREA SECURITY

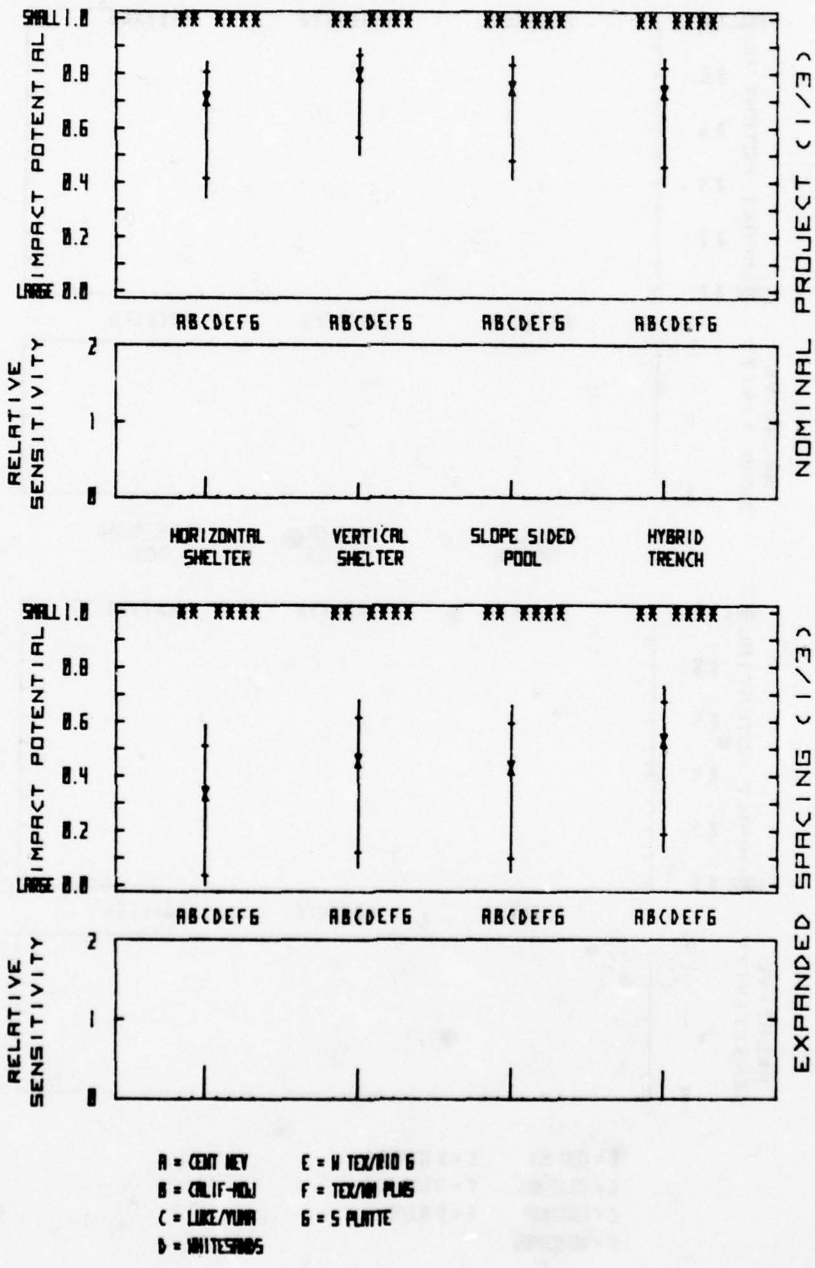


Figure B-181

PARAMETRIC IMPACT ANALYSIS

B-37 INTERFERENCE WITH LARGE MAMMALS BY FENCING: POINT SECURITY

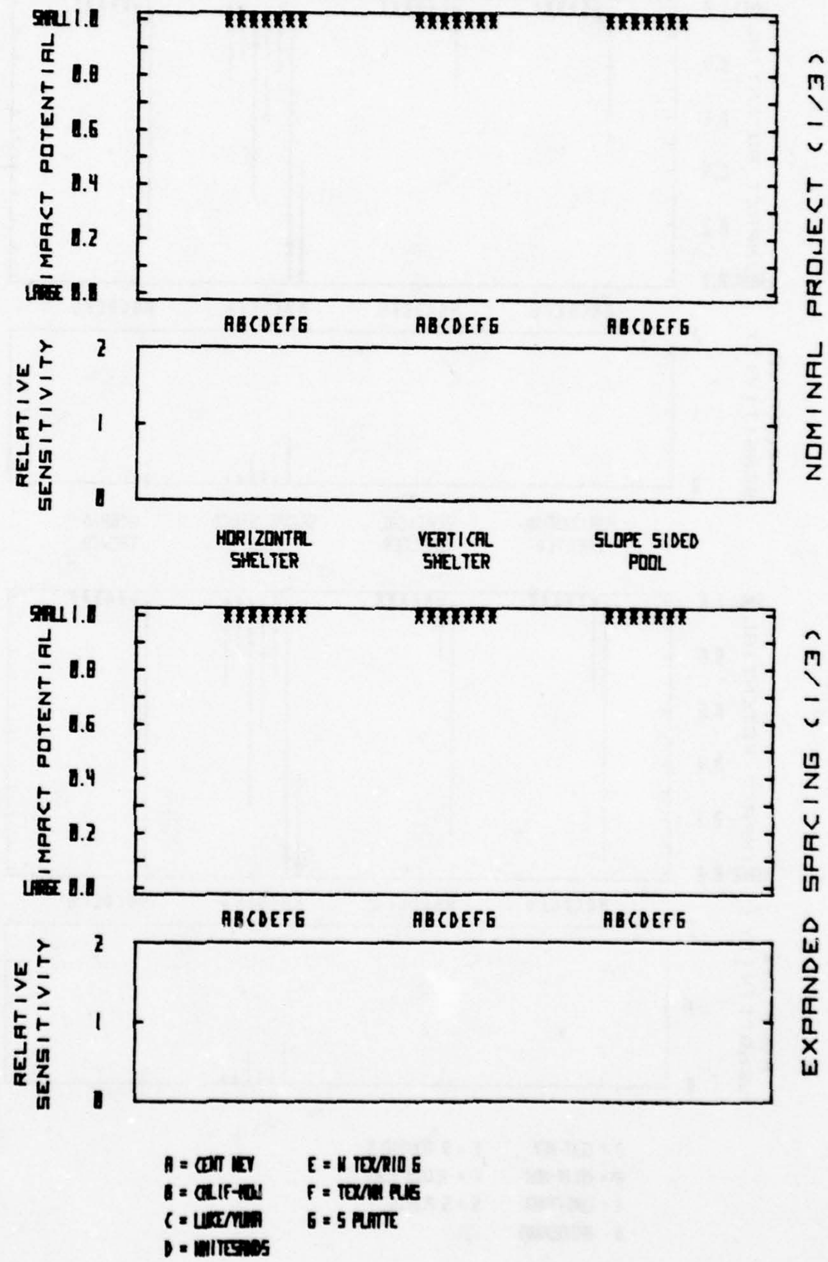


Figure B-182

PARAMETRIC IMPACT ANALYSIS

B-30: THREAT TO PROTECTED AQUATIC SPECIES: AREA SECURITY

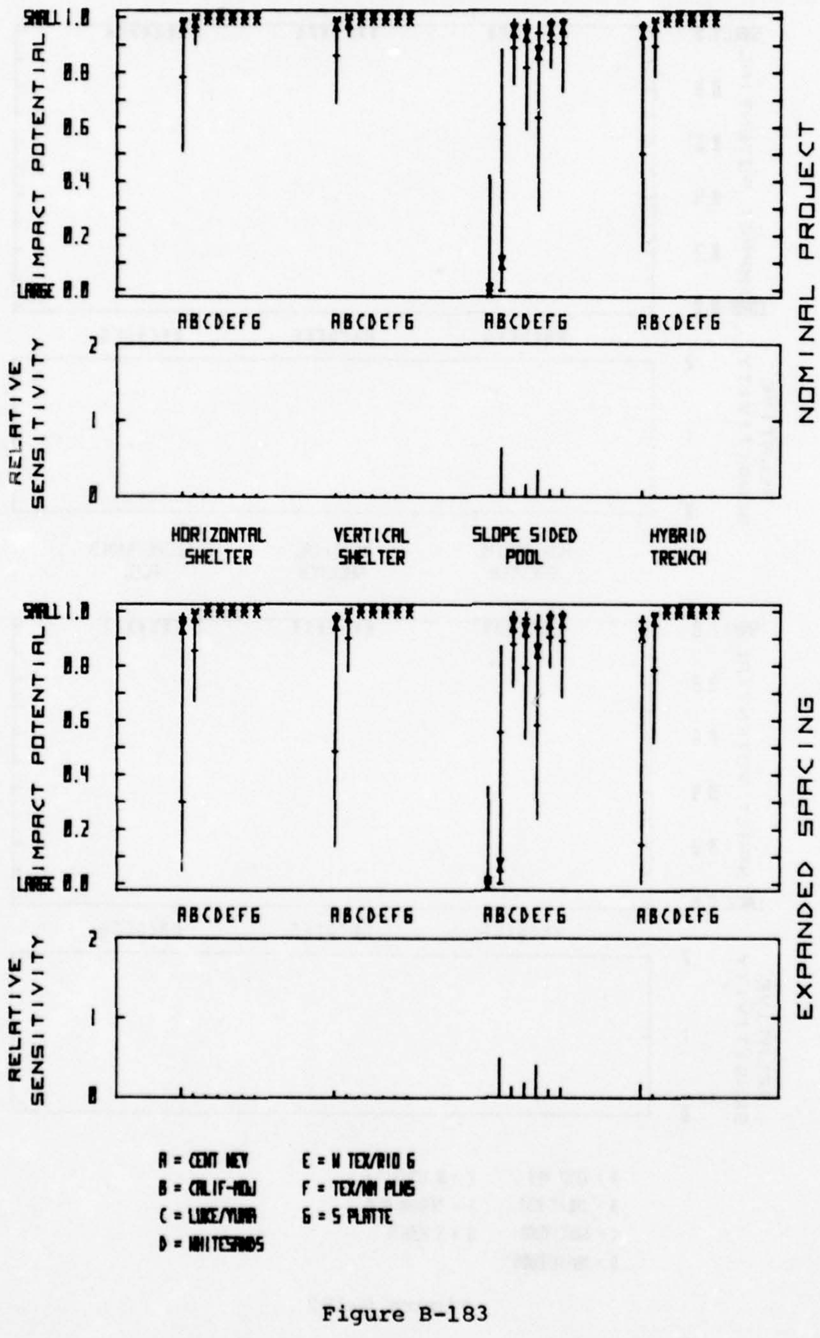
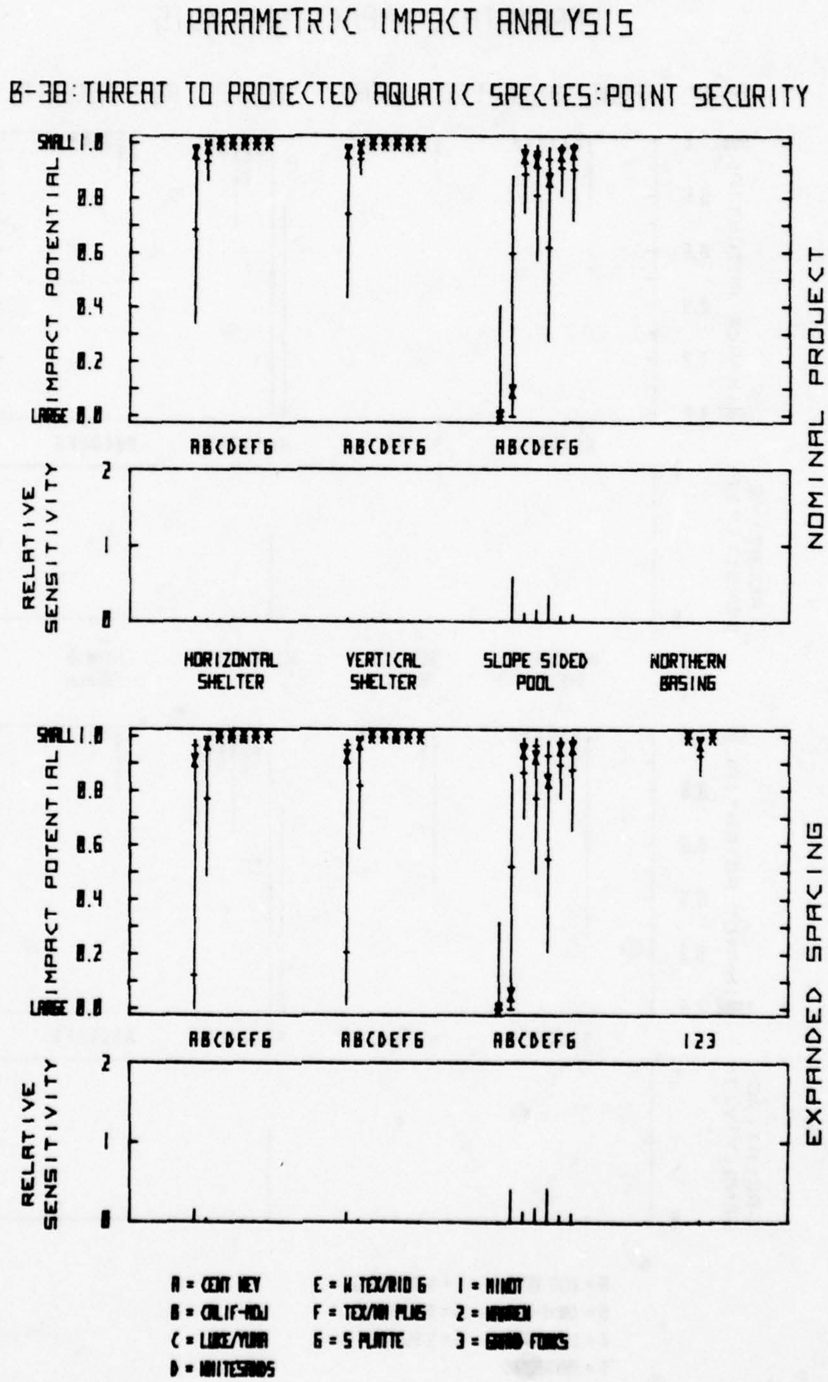


Figure B-183

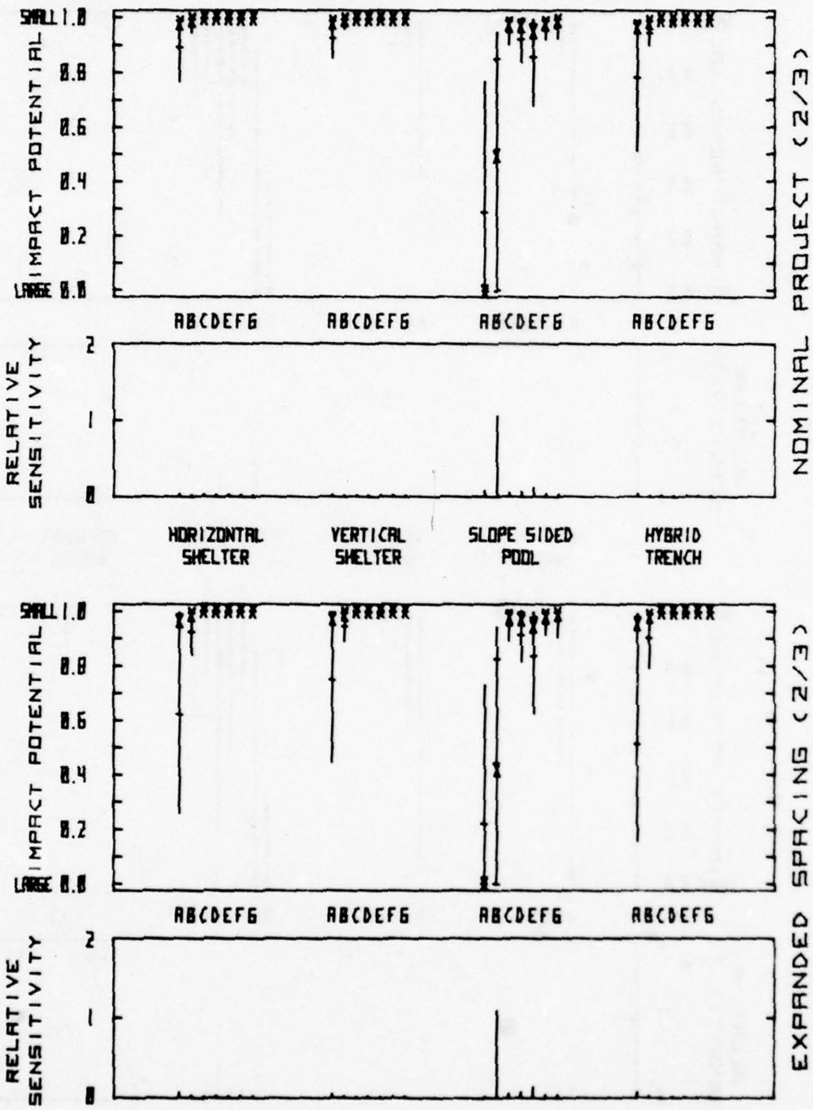


PARAMETRIC IMPACT ANALYSIS
B-38: THREAT TO PROTECTED AQUATIC SPECIES: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
ABCDEFG
ABCDEFG
123
RELATIVE SENSITIVITY
2
1
0
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-184

PARAMETRIC IMPACT ANALYSIS

B-38 THREAT TO PROTECTED AQUATIC SPECIES: AREA SECURITY



A = CENT NEV
B = CALIF-NDJ
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-185

PARAMETRIC IMPACT ANALYSIS

B-38 THREAT TO PROTECTED AQUATIC SPECIES: POINT SECURITY

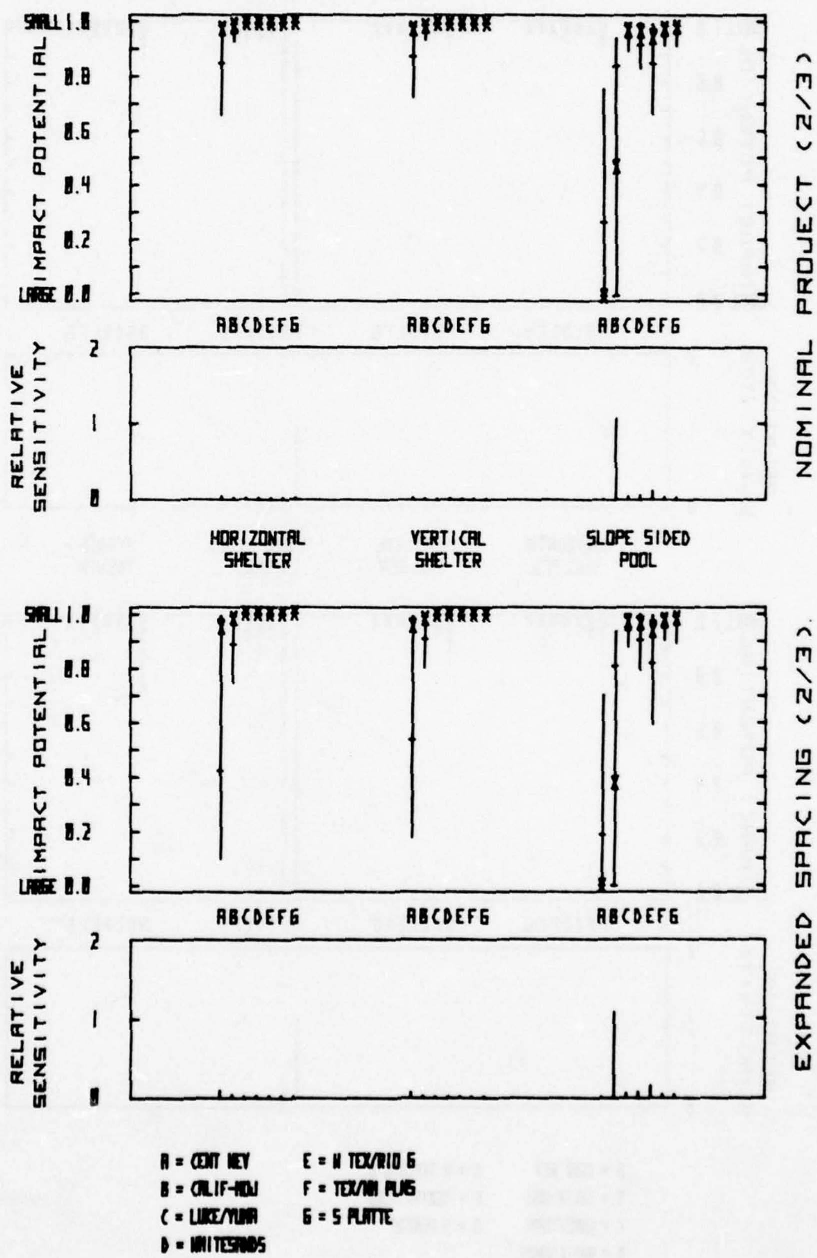


Figure B-186

PARAMETRIC IMPACT ANALYSIS

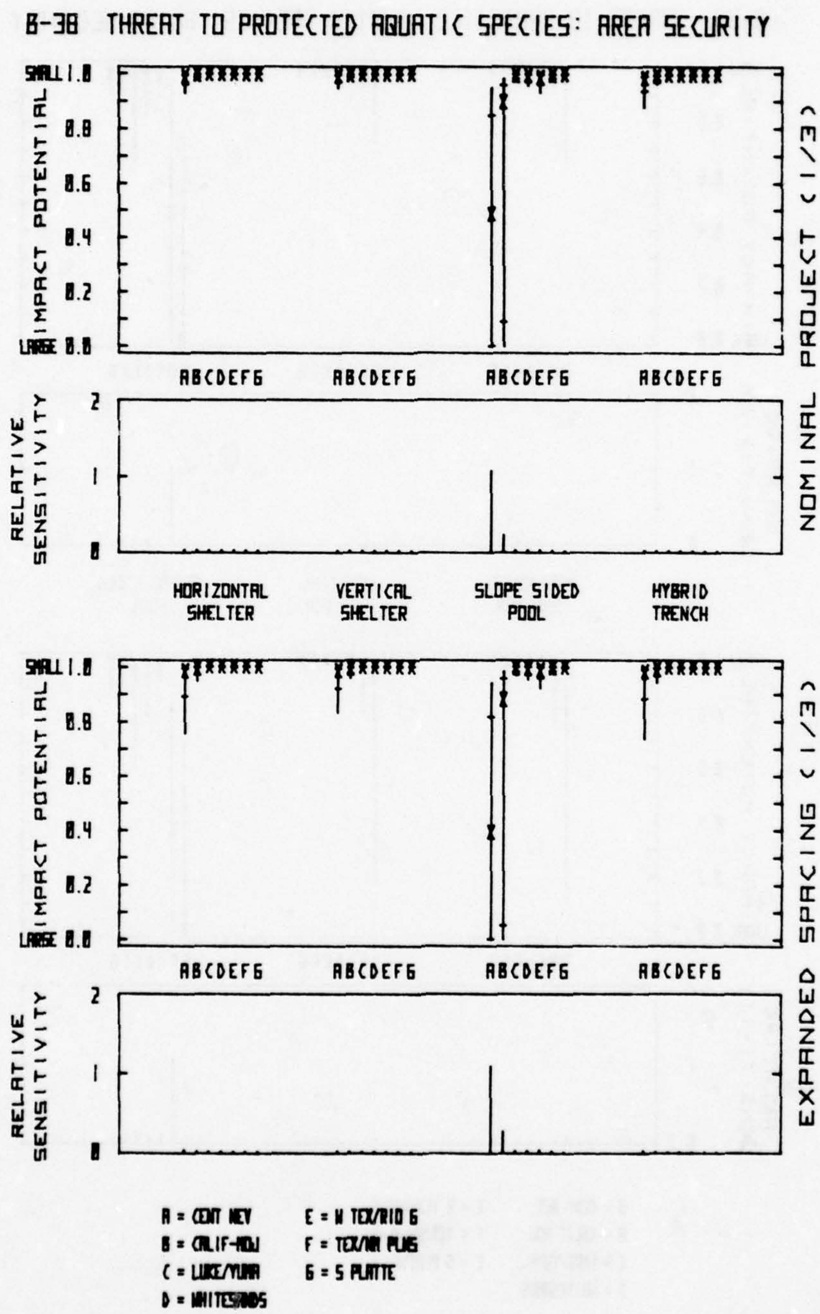


Figure B-187

PARAMETRIC IMPACT ANALYSIS

B-38 THREAT TO PROTECTED AQUATIC SPECIES: POINT SECURITY

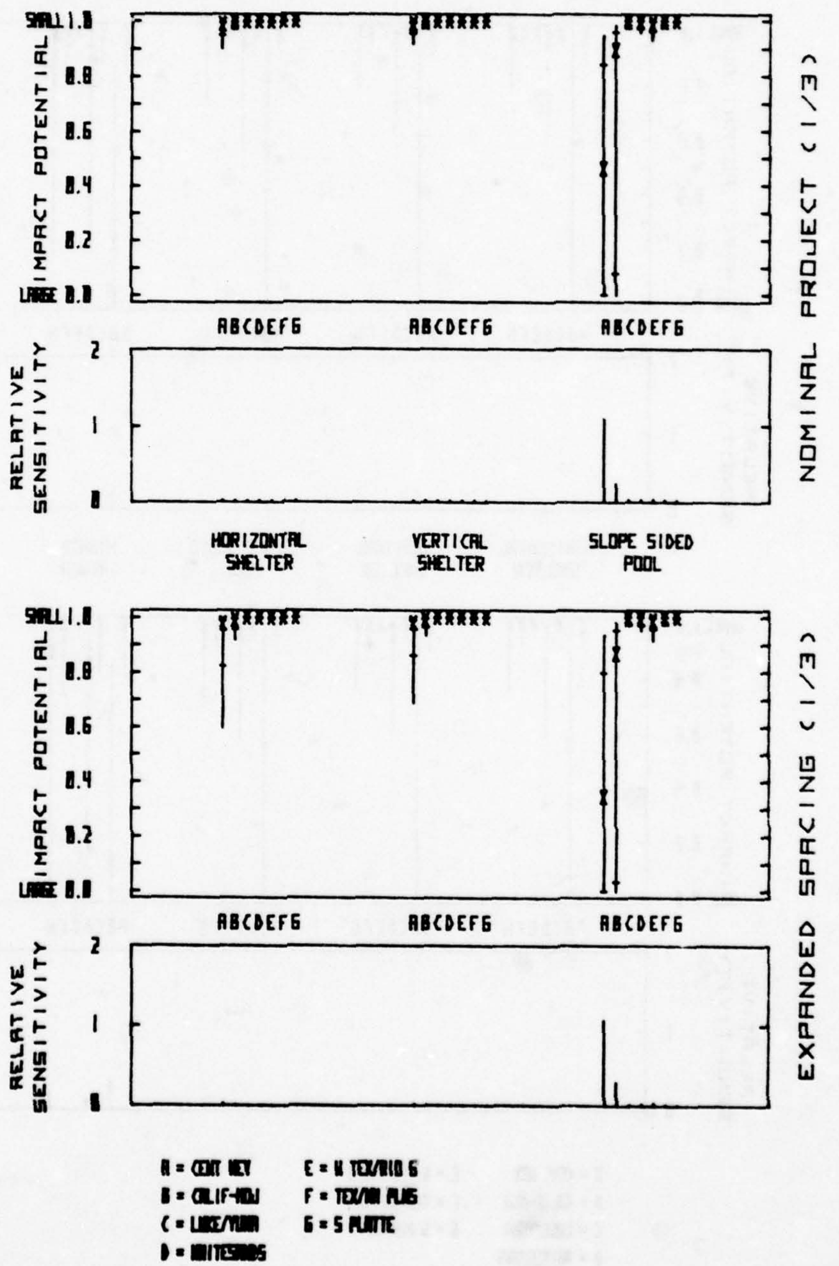


Figure B-188

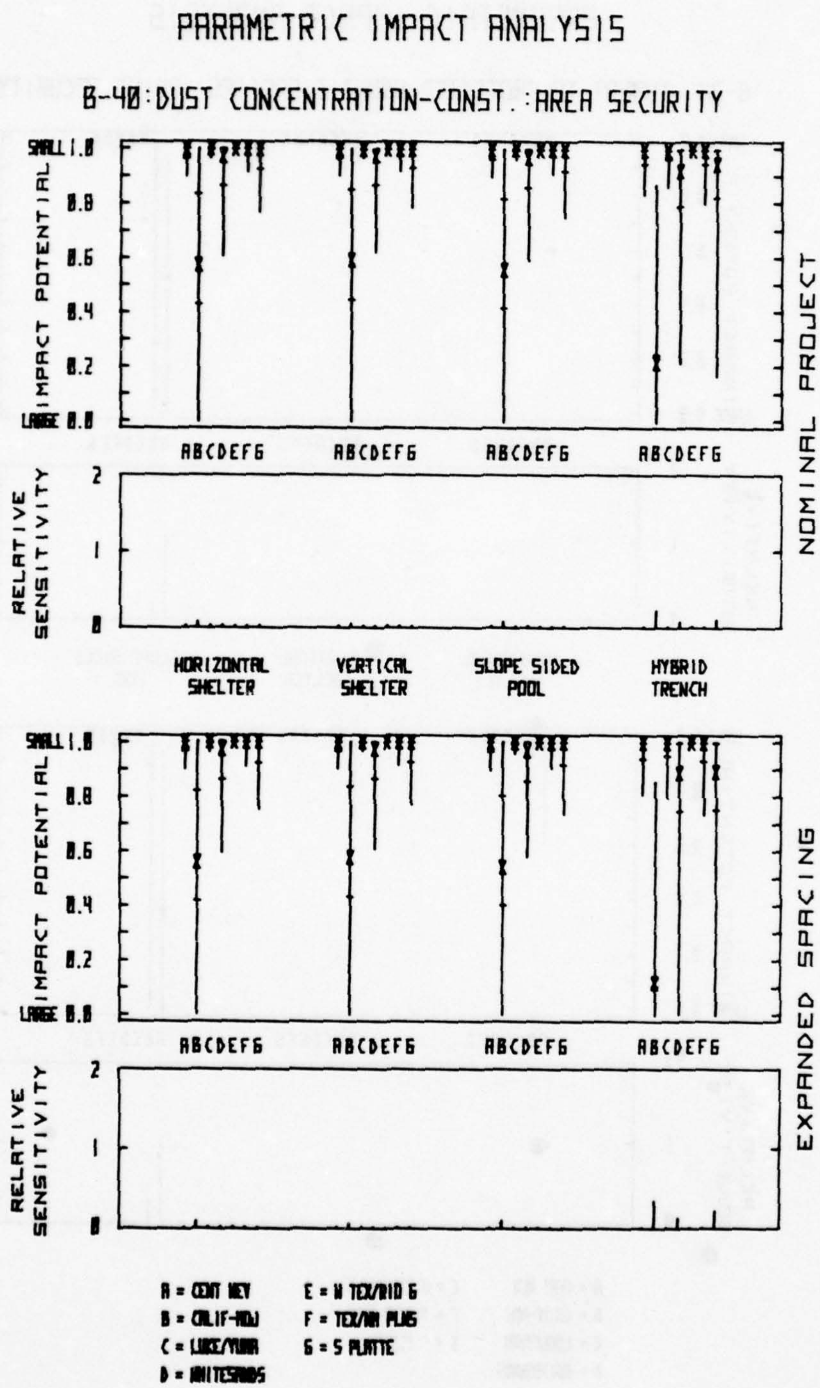

PARAMETRIC IMPACT ANALYSIS
B-40:DUST CONCENTRATION-CONST.:AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/OID G
F = TEX/NM PLNS
G = S PLATTE

Figure B-189

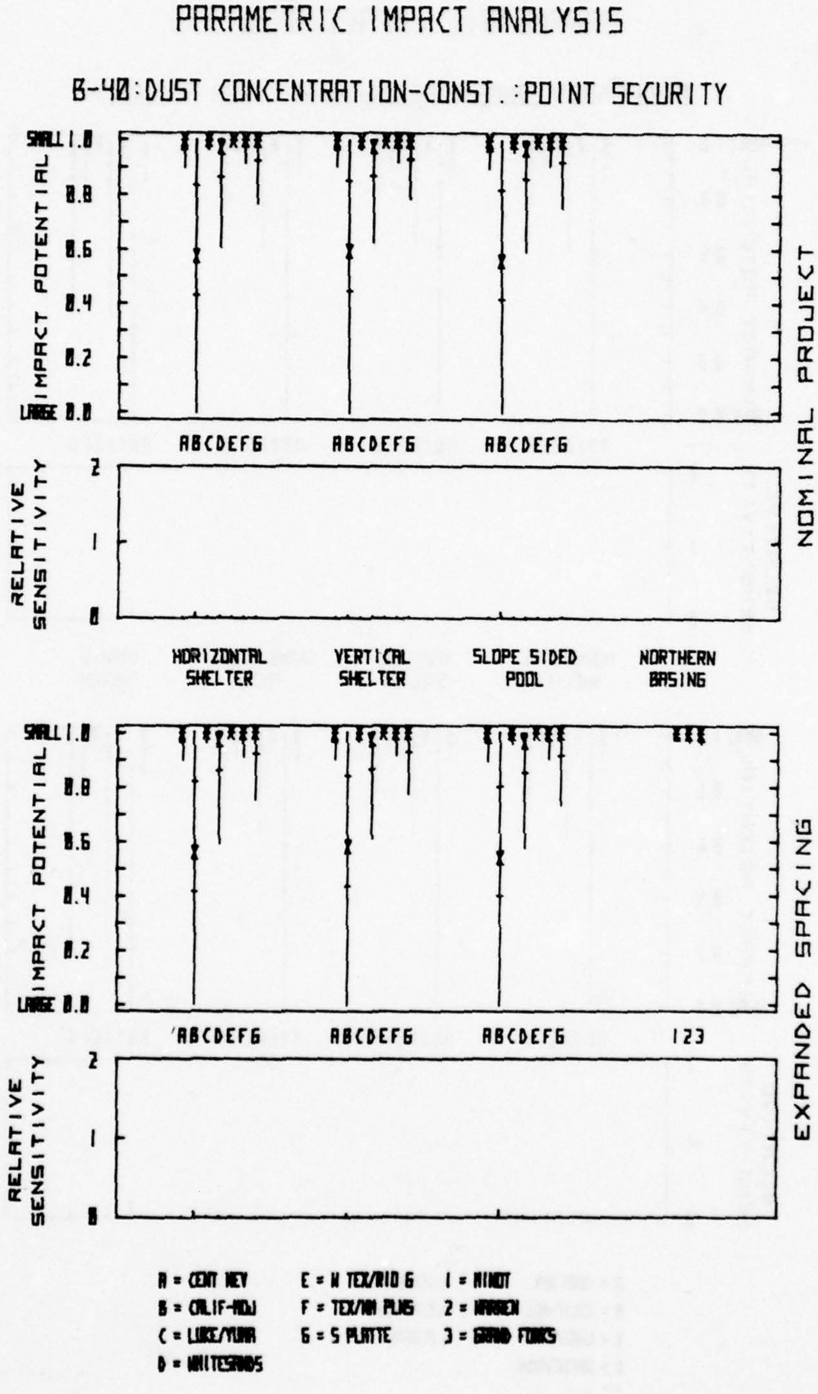

PARAMETRIC IMPACT ANALYSIS
B-40:DUST CONCENTRATION-CONST.:POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
NOMINAL PROJECT
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-190

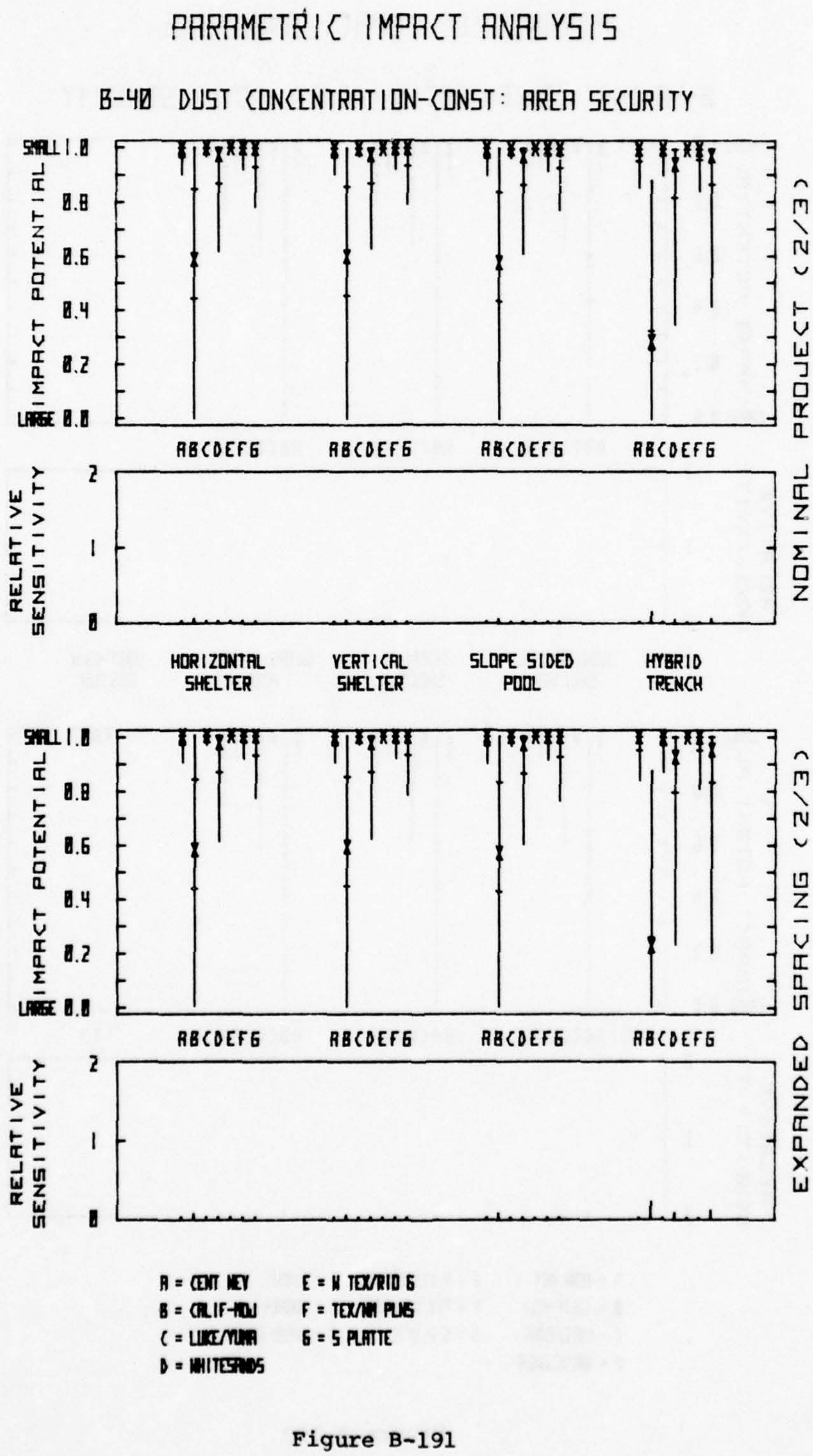

PARAMETRIC IMPACT ANALYSIS
B-40 DUST CONCENTRATION-CONST: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-191

PARAMETRIC IMPACT ANALYSIS

B-40 DUST CONCENTRATION-CONST.: POINT SECURITY

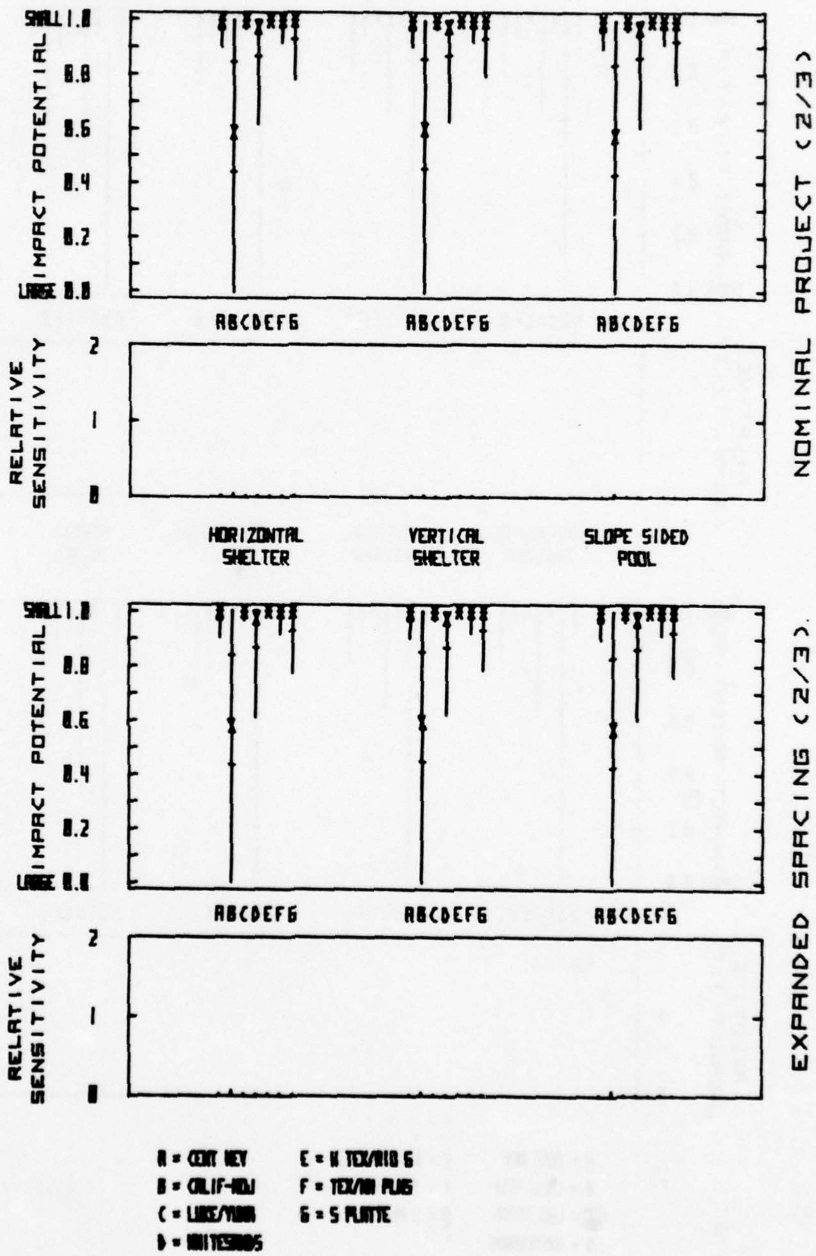


Figure B-192

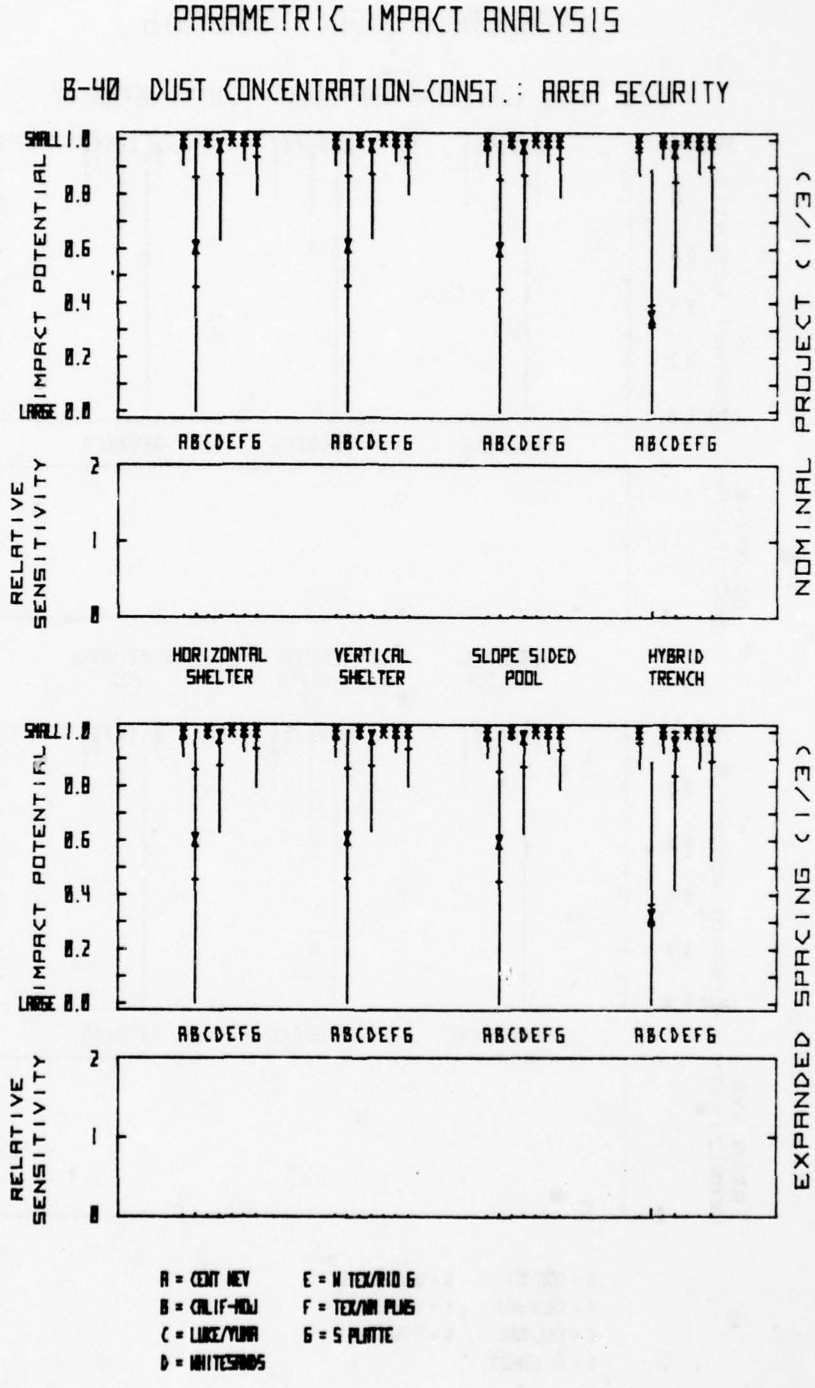

PARAMETRIC IMPACT ANALYSIS
B-40 DUST CONCENTRATION-CONST.: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (1/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-193

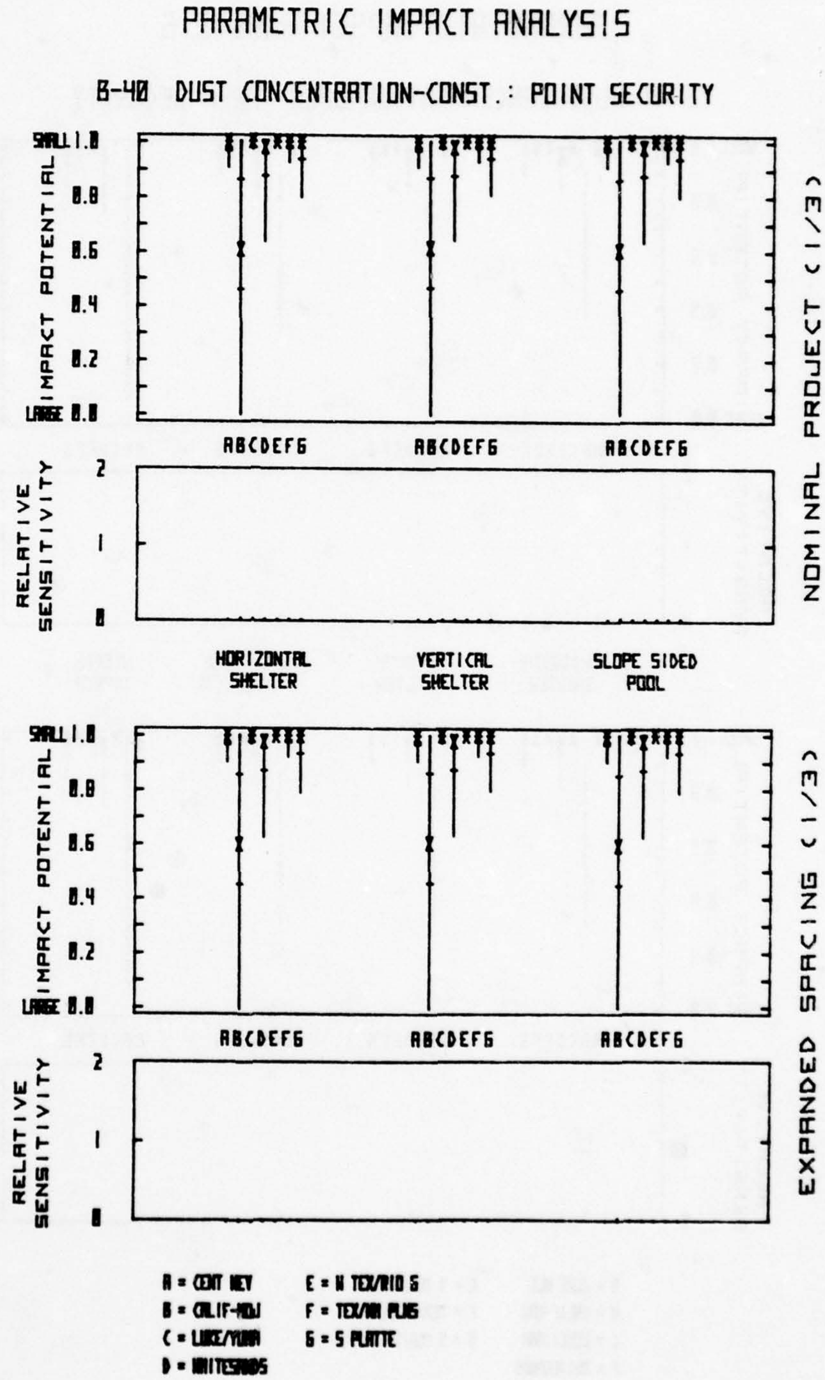

PARAMETRIC IMPACT ANALYSIS
B-40 DUST CONCENTRATION-CONST.: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LAKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-194

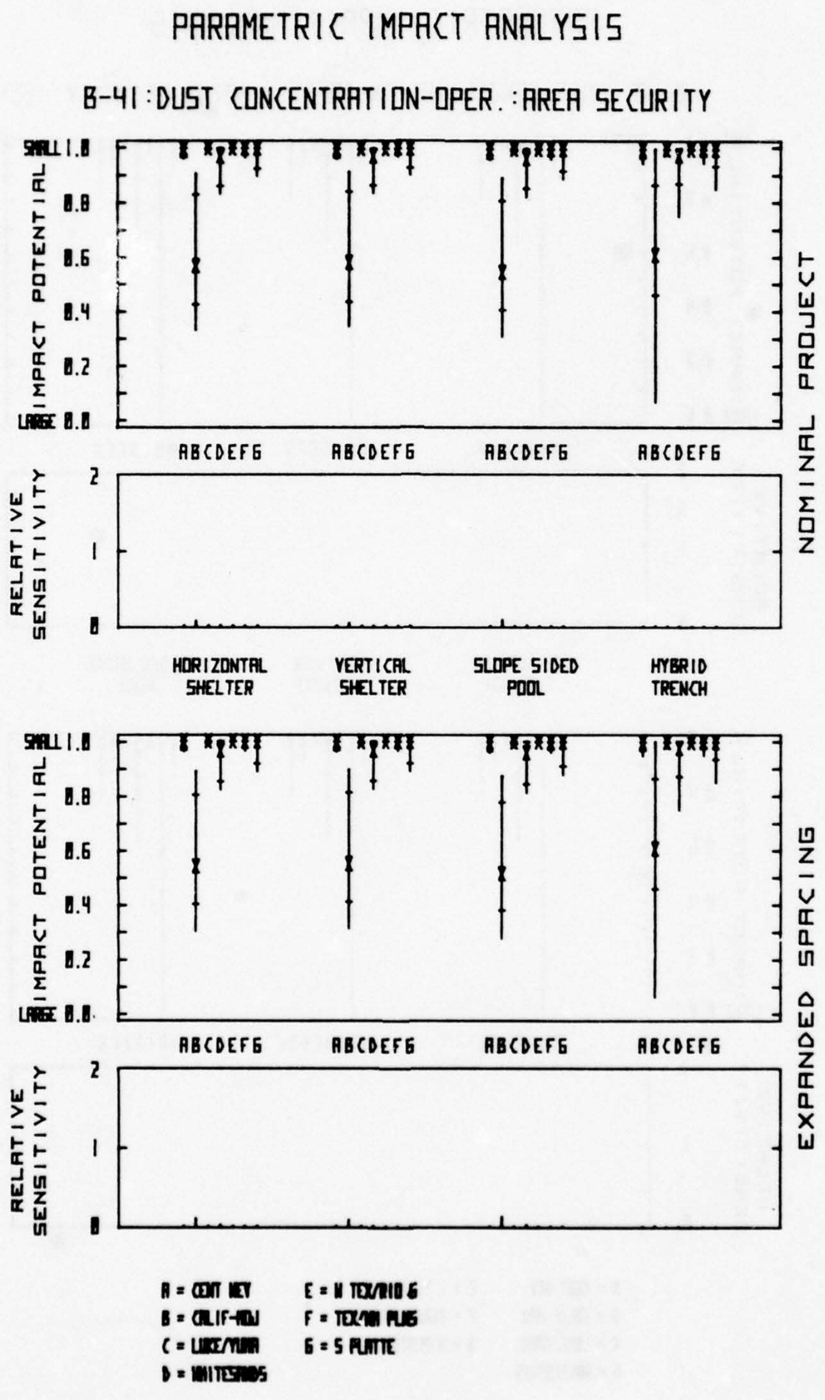

PARAMETRIC IMPACT ANALYSIS
B-41: DUST CONCENTRATION-OPER.: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-195

PARAMETRIC IMPACT ANALYSIS

B-41:DUST CONCENTRATION-OPER.:POINT SECURITY

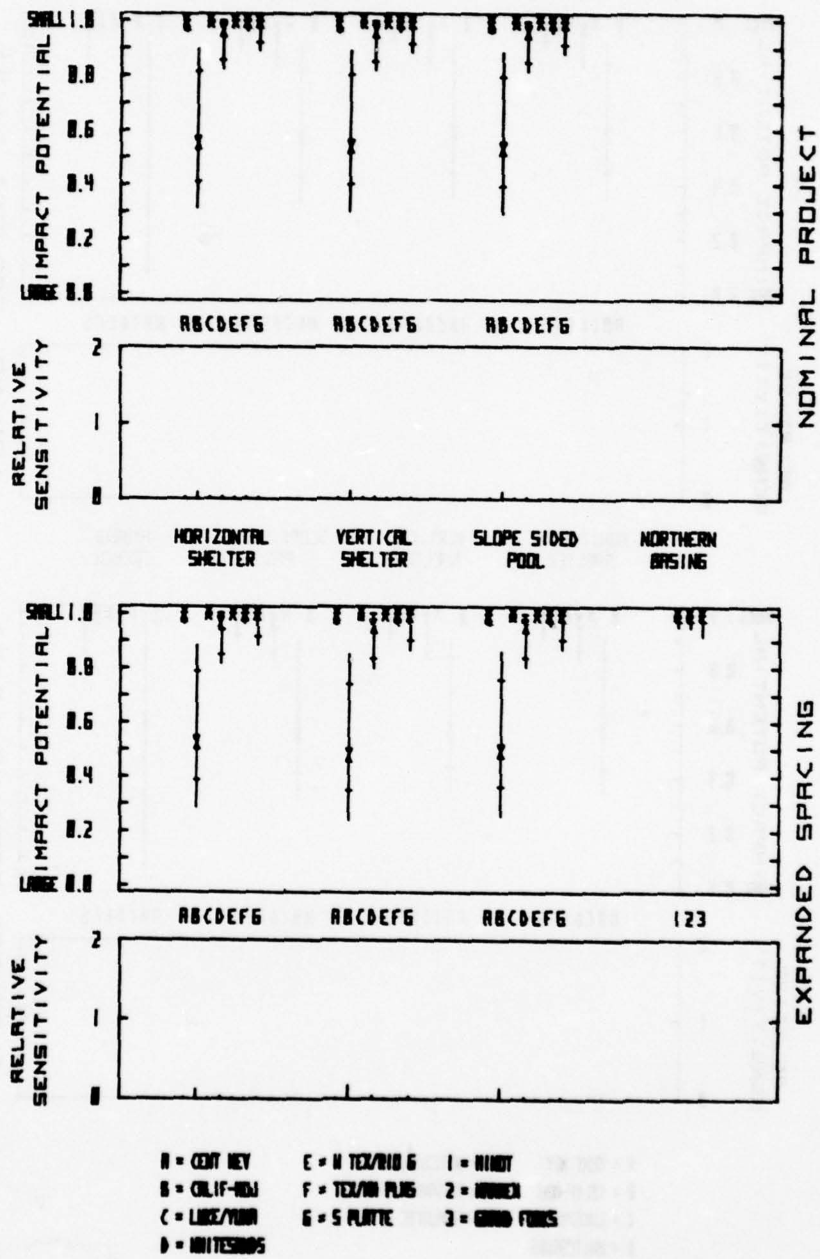
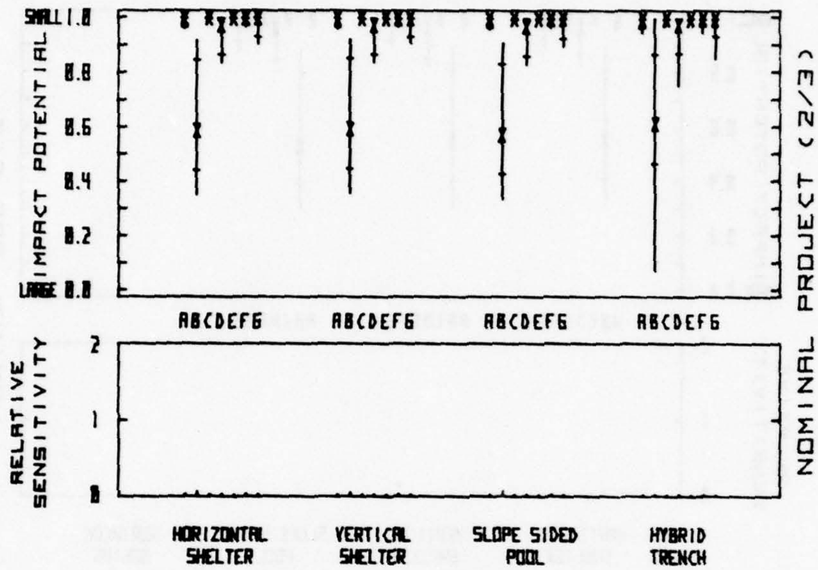
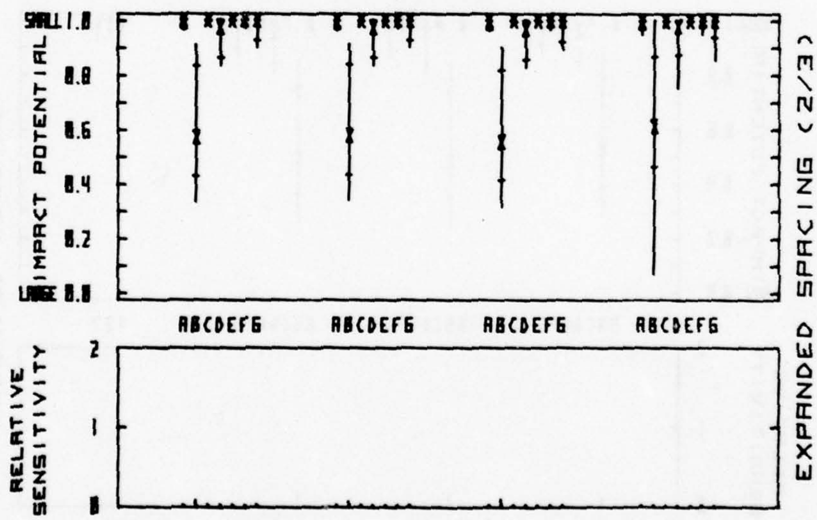


Figure B-196

PARAMETRIC IMPACT ANALYSIS

B-41 DUST CONCENTRATION-OPER: AREA SECURITY





A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-197

PARAMETRIC IMPACT ANALYSIS

B-41 DUST CONCENTRATION-OPER.: POINT SECURITY

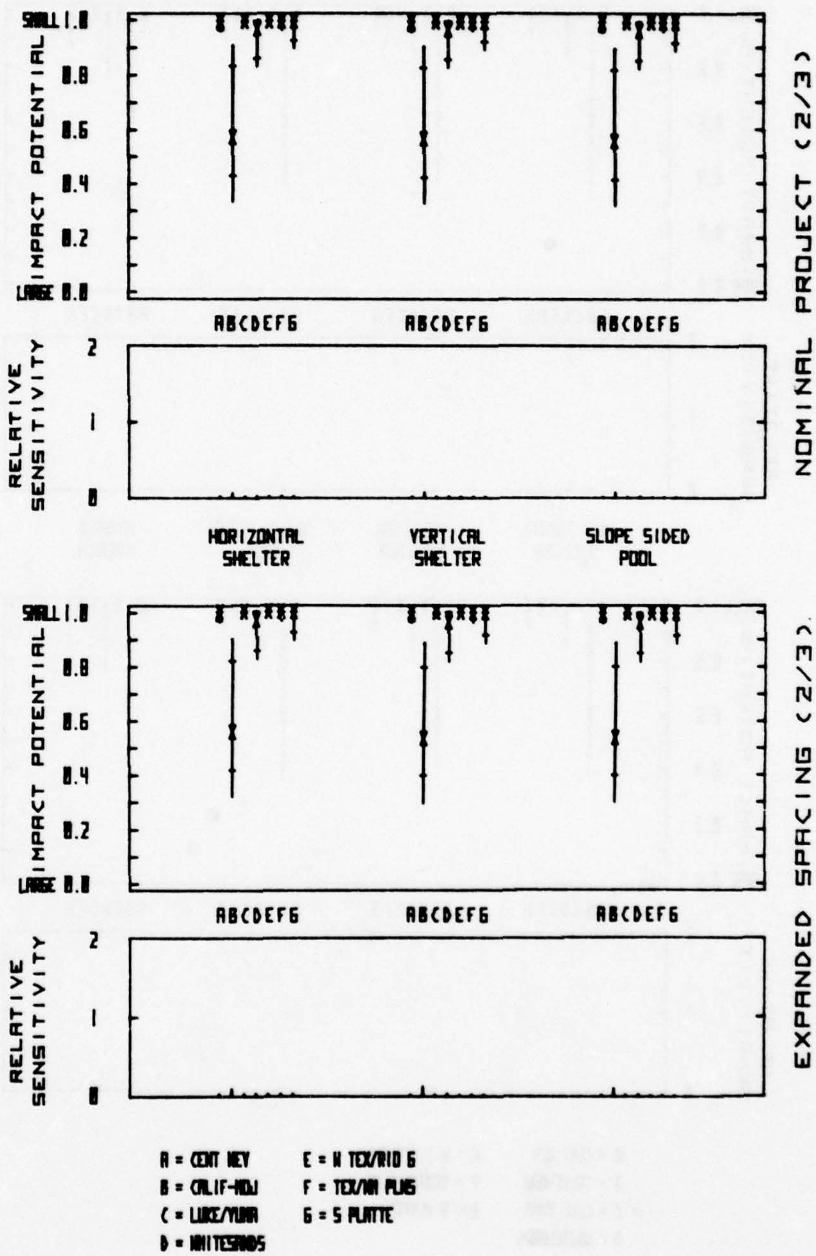


Figure B-198

PARAMETRIC IMPACT ANALYSIS

B-41 DUST CONCENTRATION-OPER.: AREA SECURITY

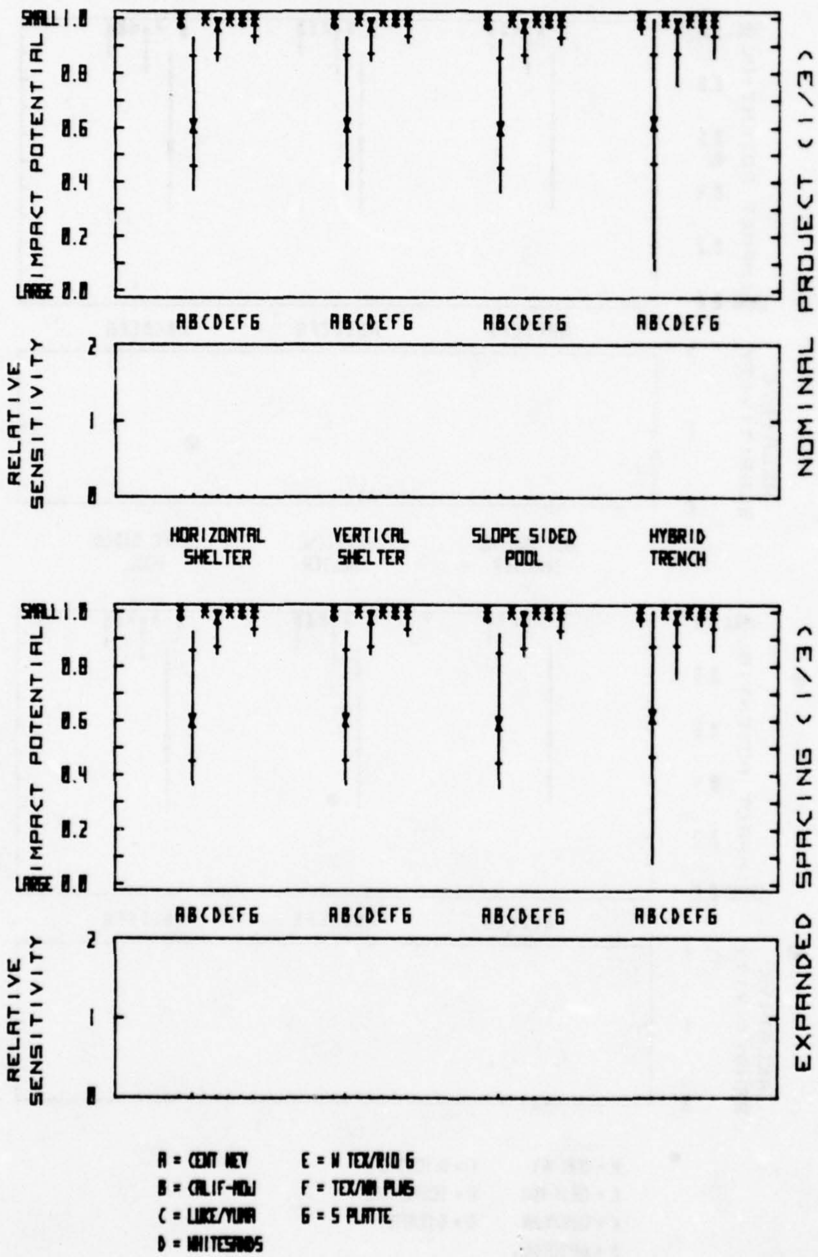


Figure B-199

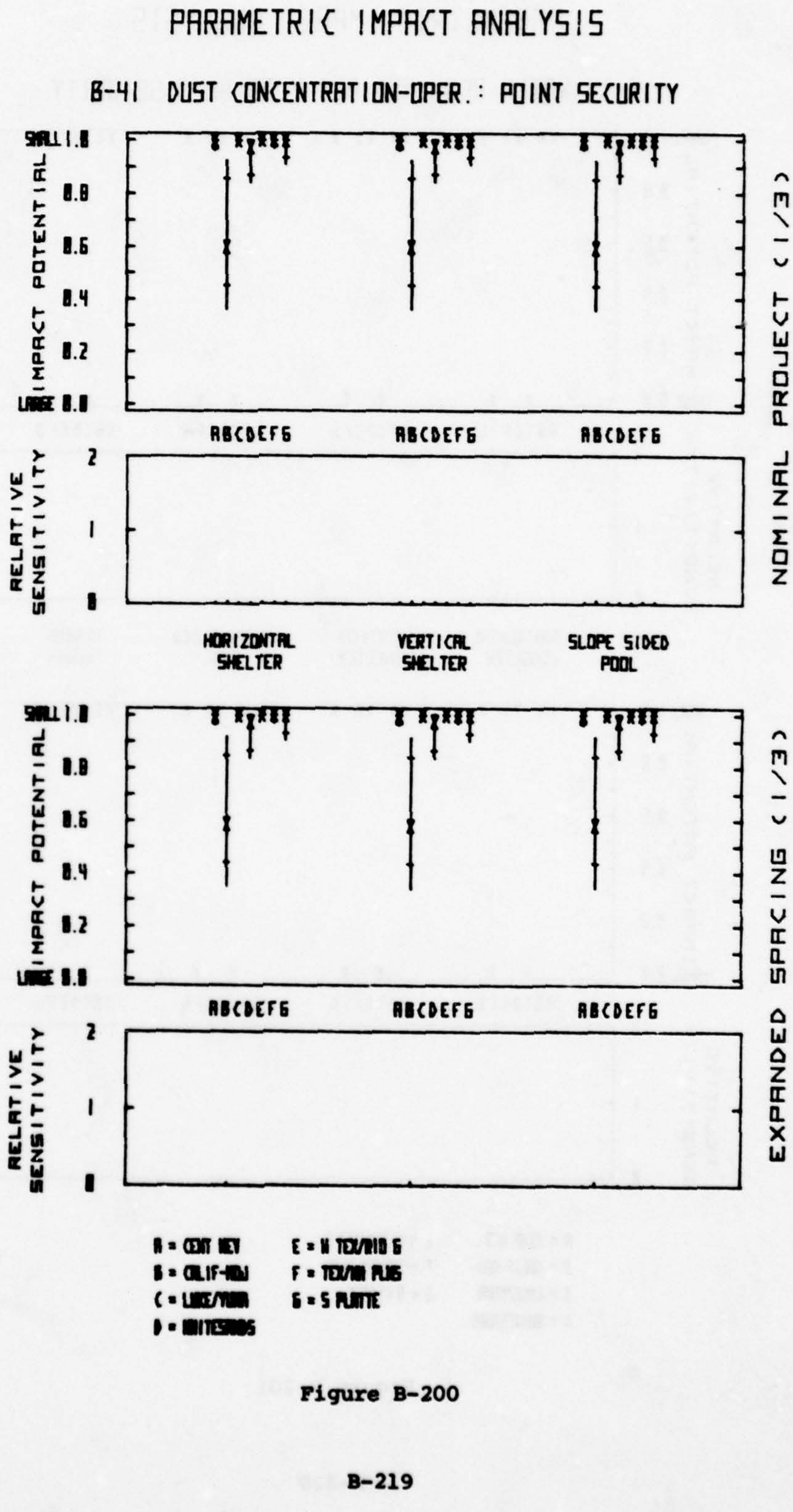

PARAMETRIC IMPACT ANALYSIS
B-41 DUST CONCENTRATION-OPER.: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-200

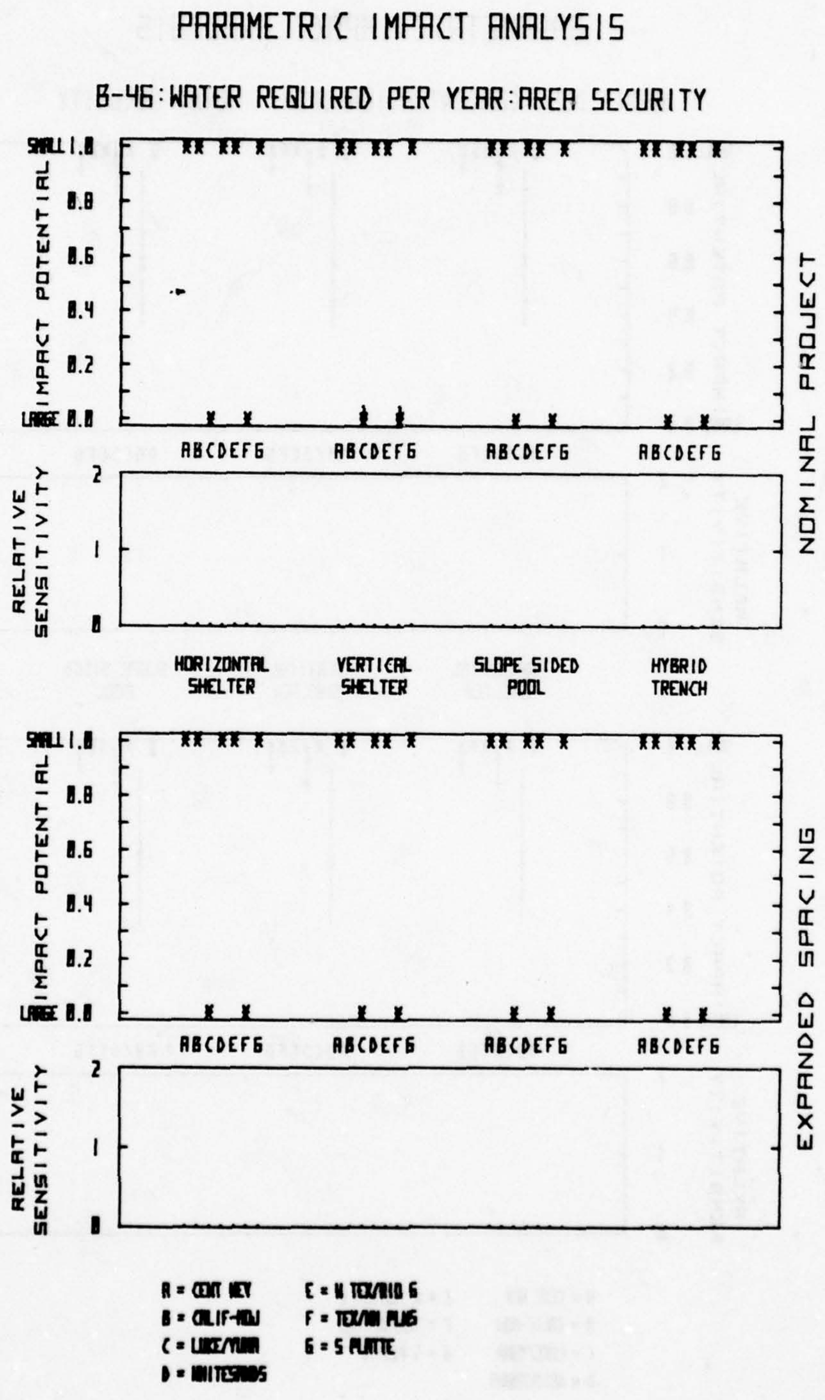

PARAMETRIC IMPACT ANALYSIS
B-46: WATER REQUIRED PER YEAR: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-201

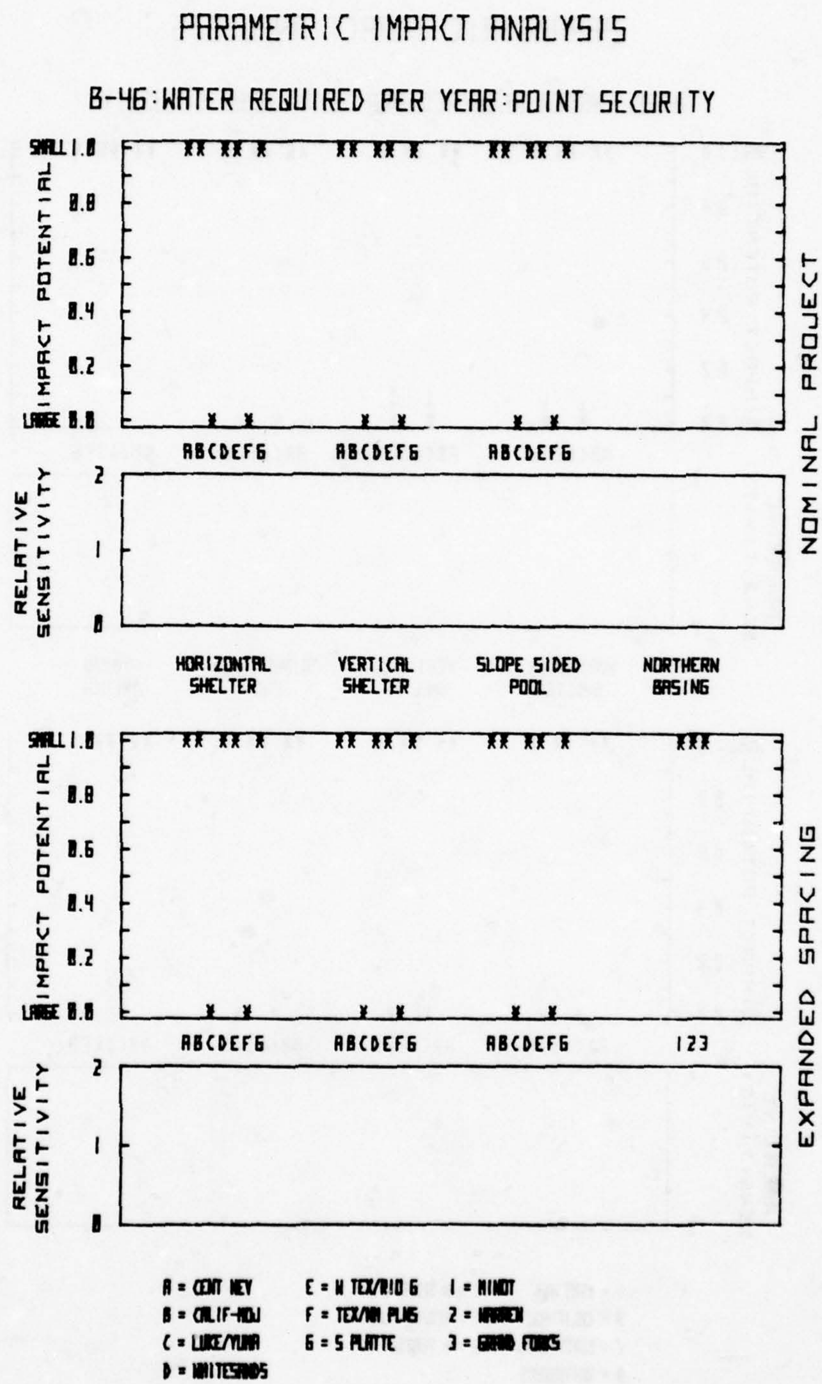

PARAMETRIC IMPACT ANALYSIS
B-46: WATER REQUIRED PER YEAR: POINT SECURITY
NOMINAL PROJECT
EXPANDED SPACING
IMPACT POTENTIAL
RELATIVE SENSITIVITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-202

PARAMETRIC IMPACT ANALYSIS

B-46 WATER REQUIRED PER YEAR: AREA SECURITY

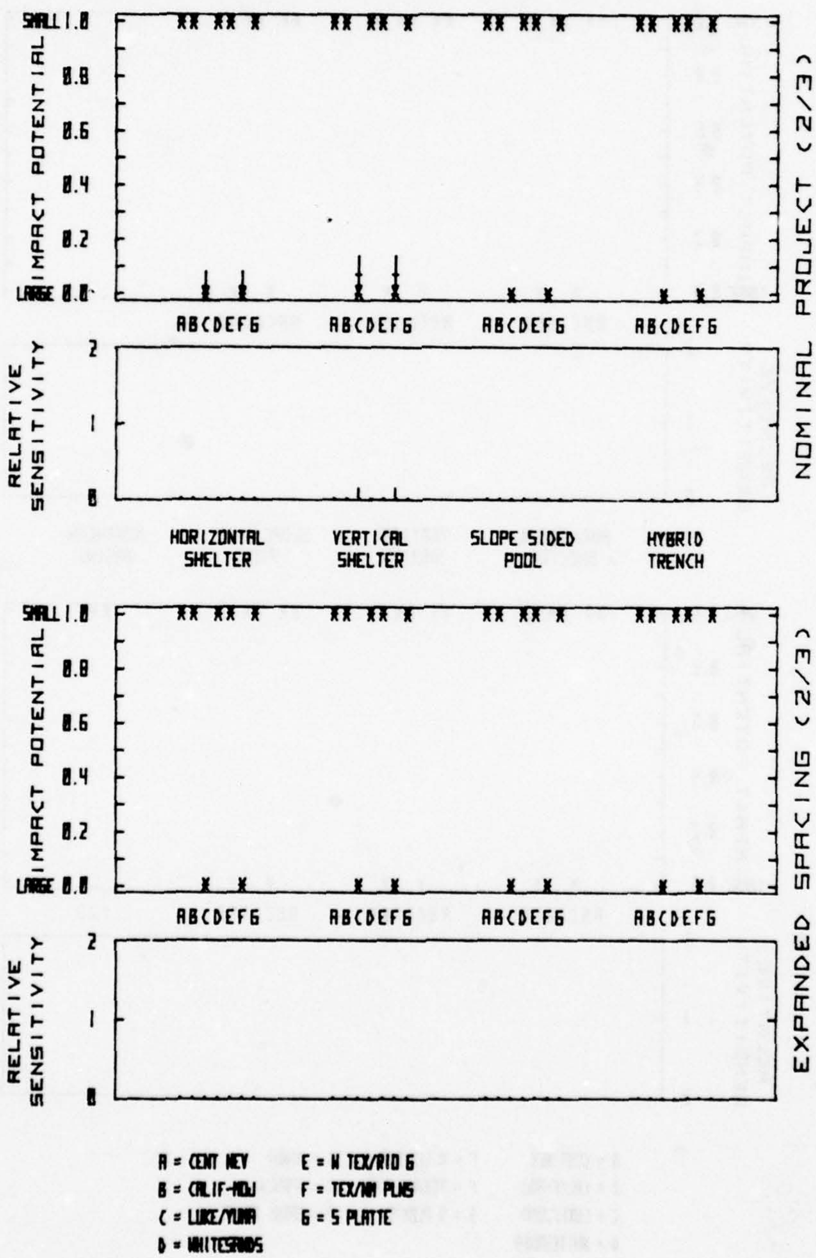


Figure B-203

PARAMETRIC IMPACT ANALYSIS

B-46 WATER REQUIRED PER YEAR: POINT SECURITY

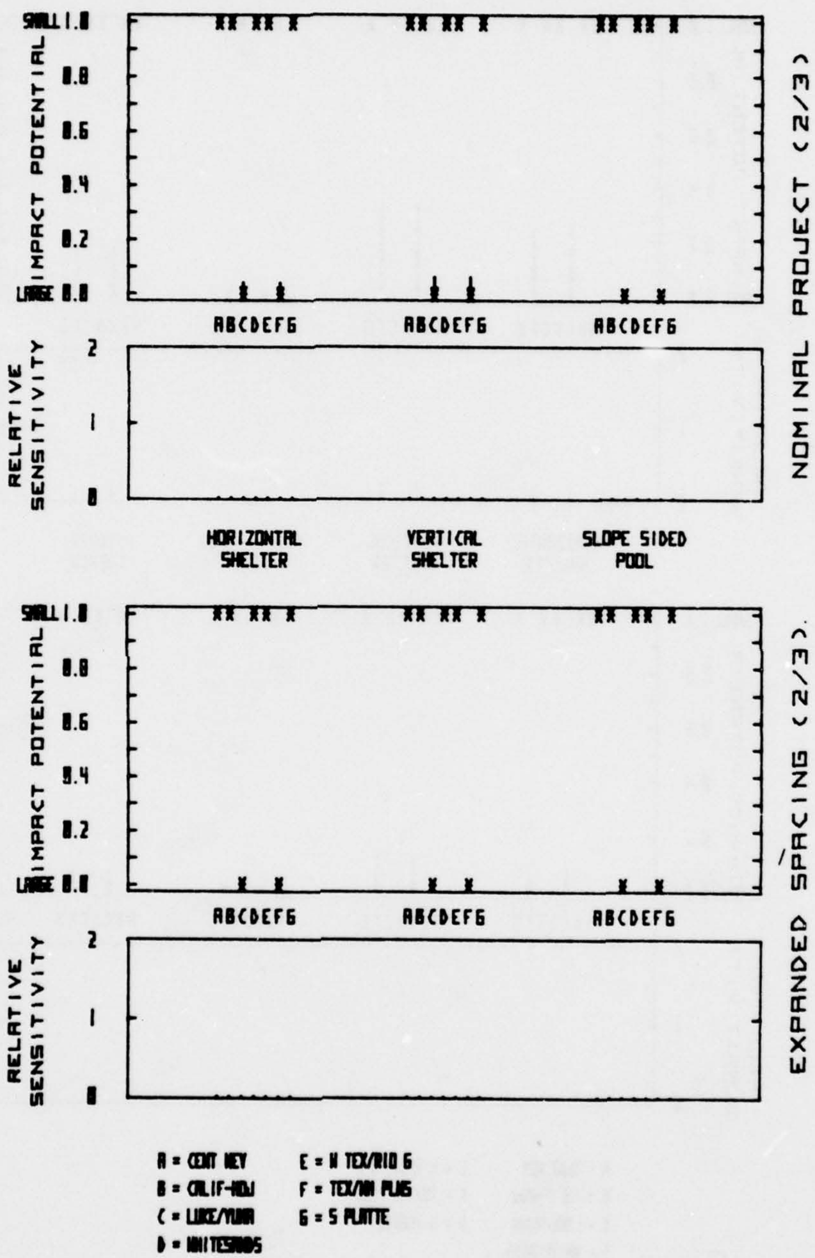


Figure B-204

PARAMETRIC IMPACT ANALYSIS

B-46 WATER REQUIRED PER YEAR: AREA SECURITY

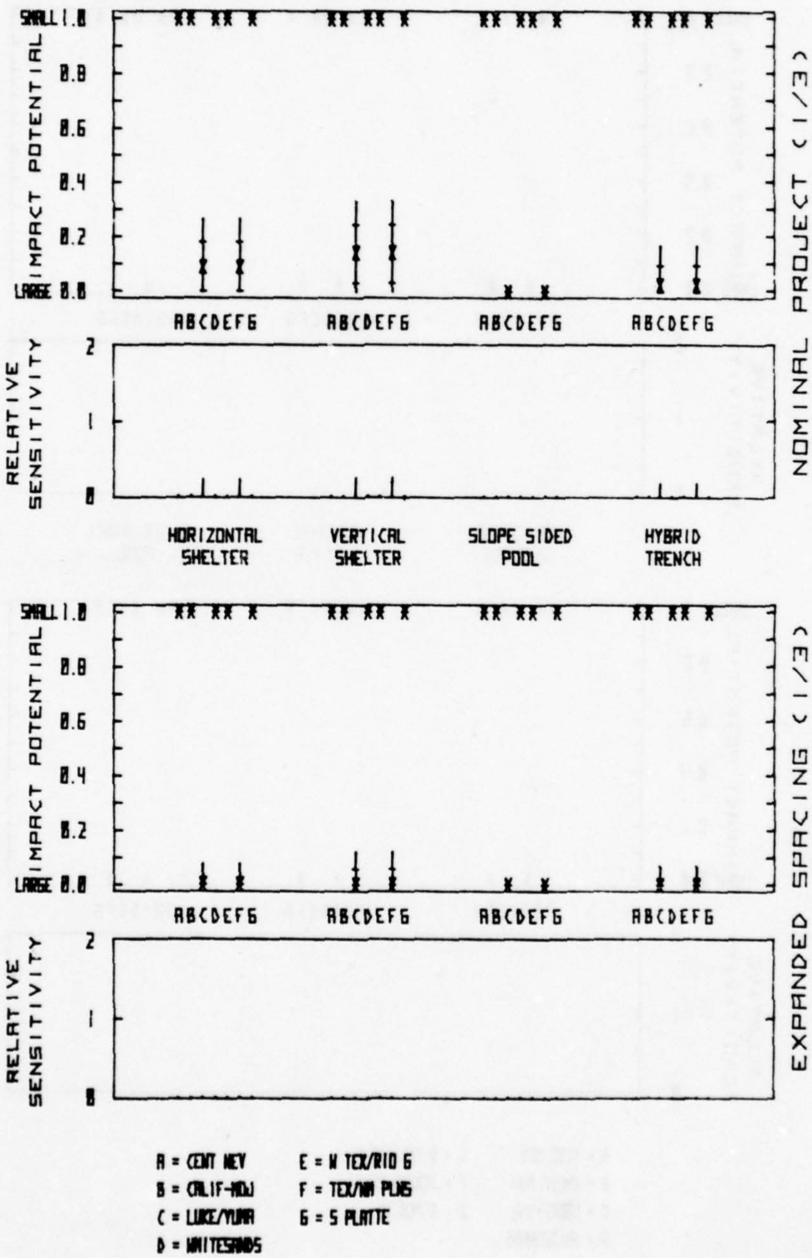


Figure B-205

PARAMETRIC IMPACT ANALYSIS

B-46 WATER REQUIRED PER YEAR: POINT SECURITY

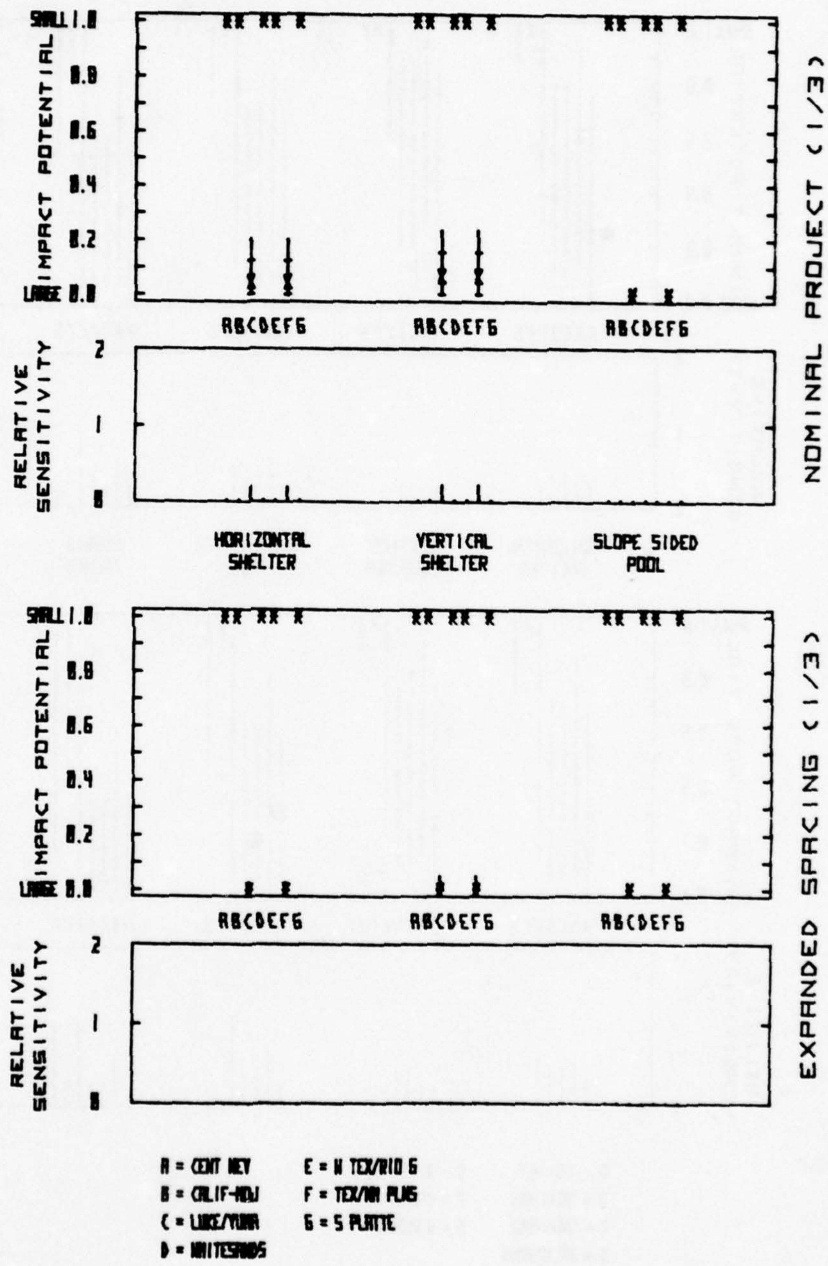


Figure B-206

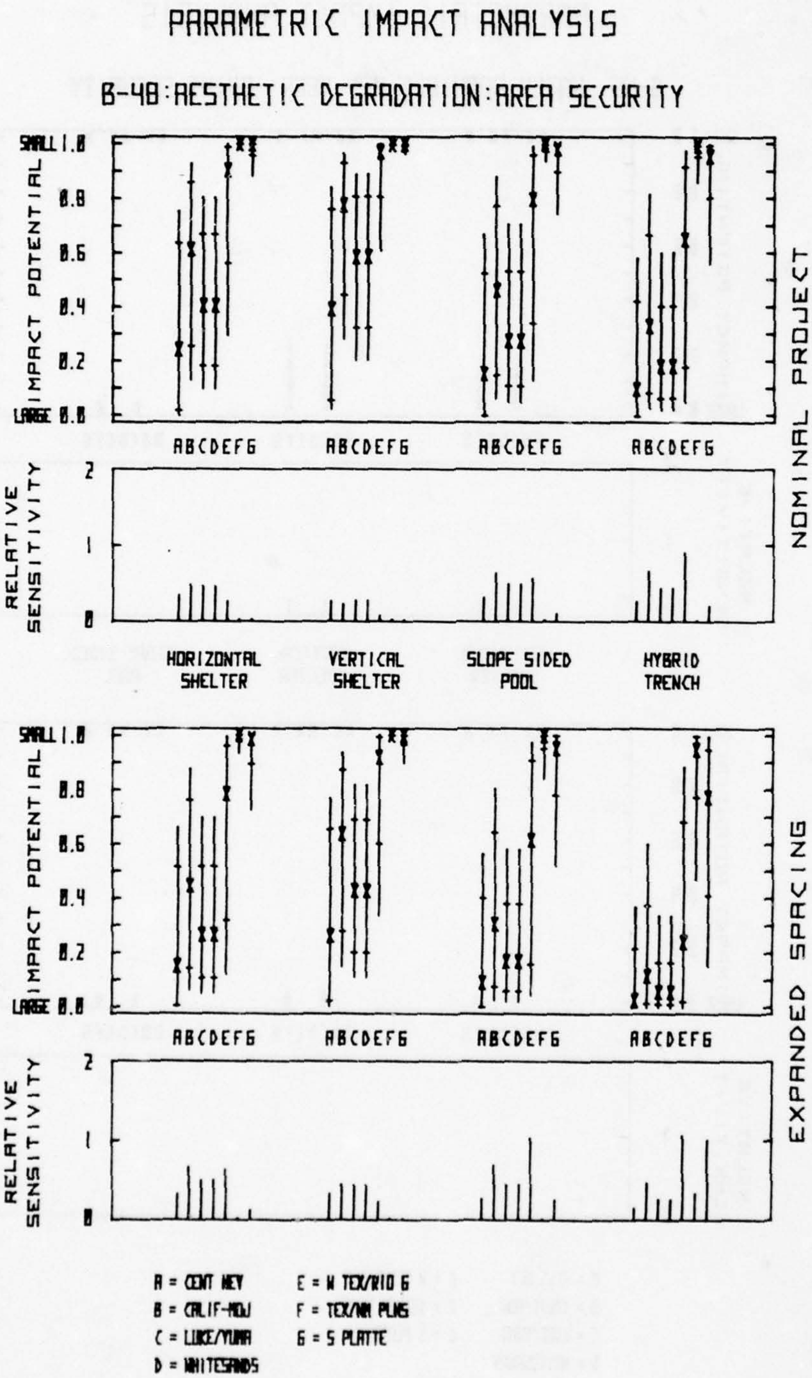

PARAMETRIC IMPACT ANALYSIS
B-48:AESTHETIC DEGRADATION:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-207

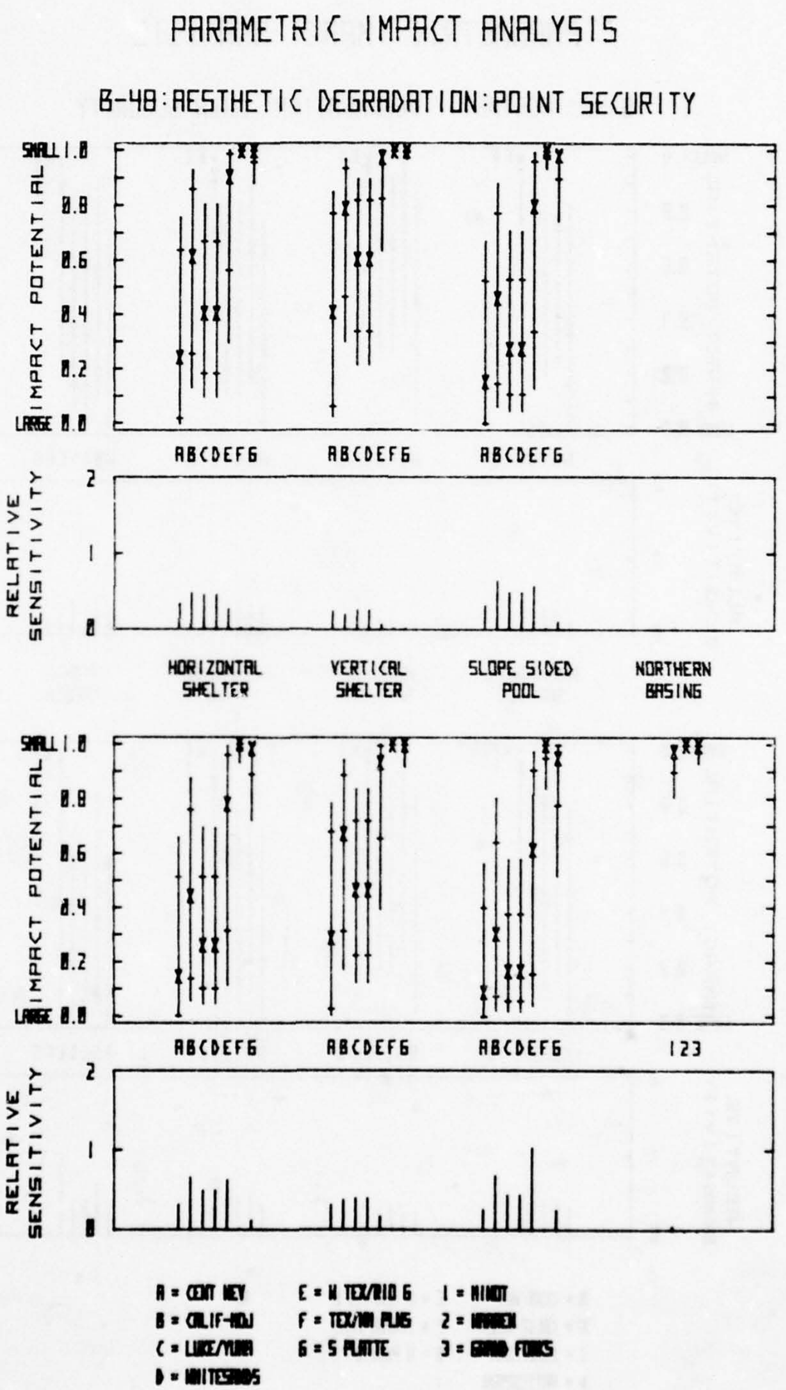

PARAMETRIC IMPACT ANALYSIS
B-48:AESTHETIC DEGRADATION:POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
ABCDEFG
ABCDEFG
ABCDEFG
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-208

PARAMETRIC IMPACT ANALYSIS

B-48 AESTHETIC DEGRADATION: AREA SECURITY

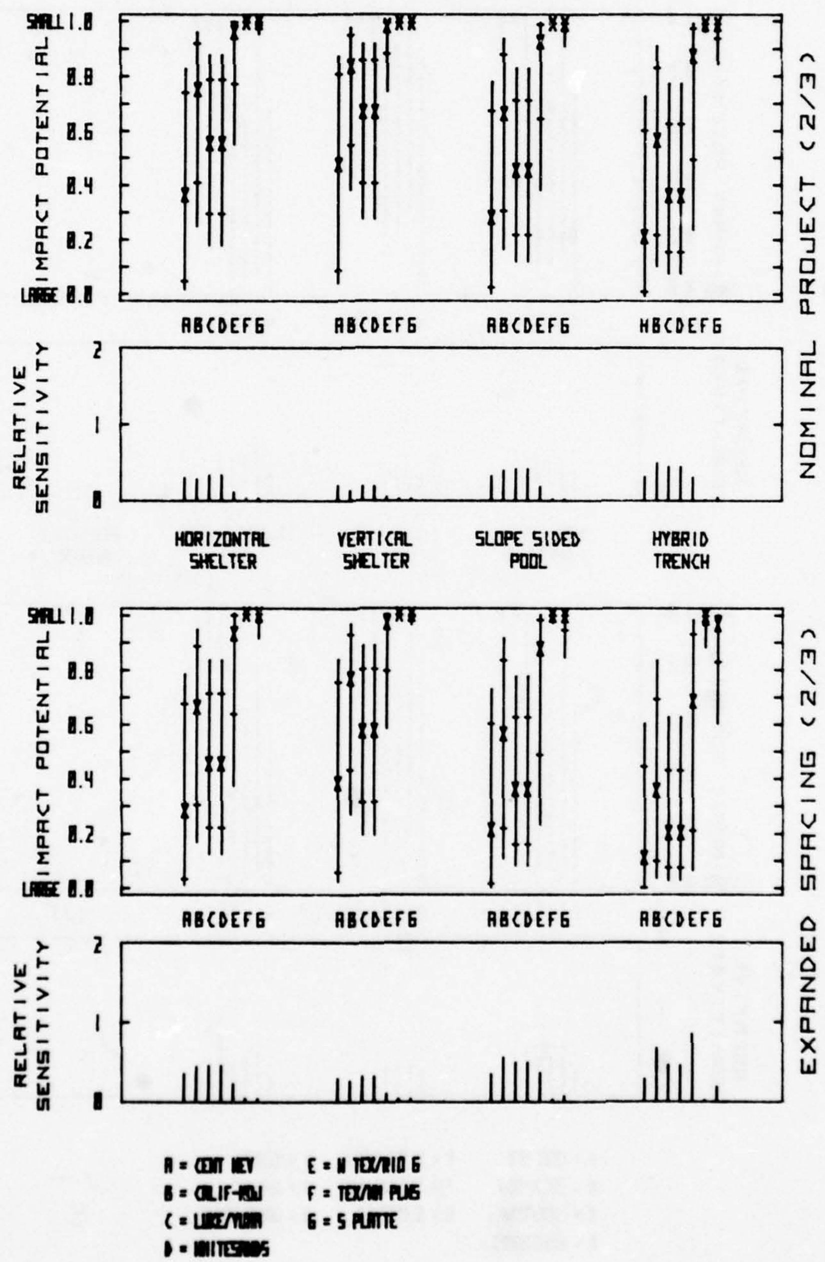


Figure B-209

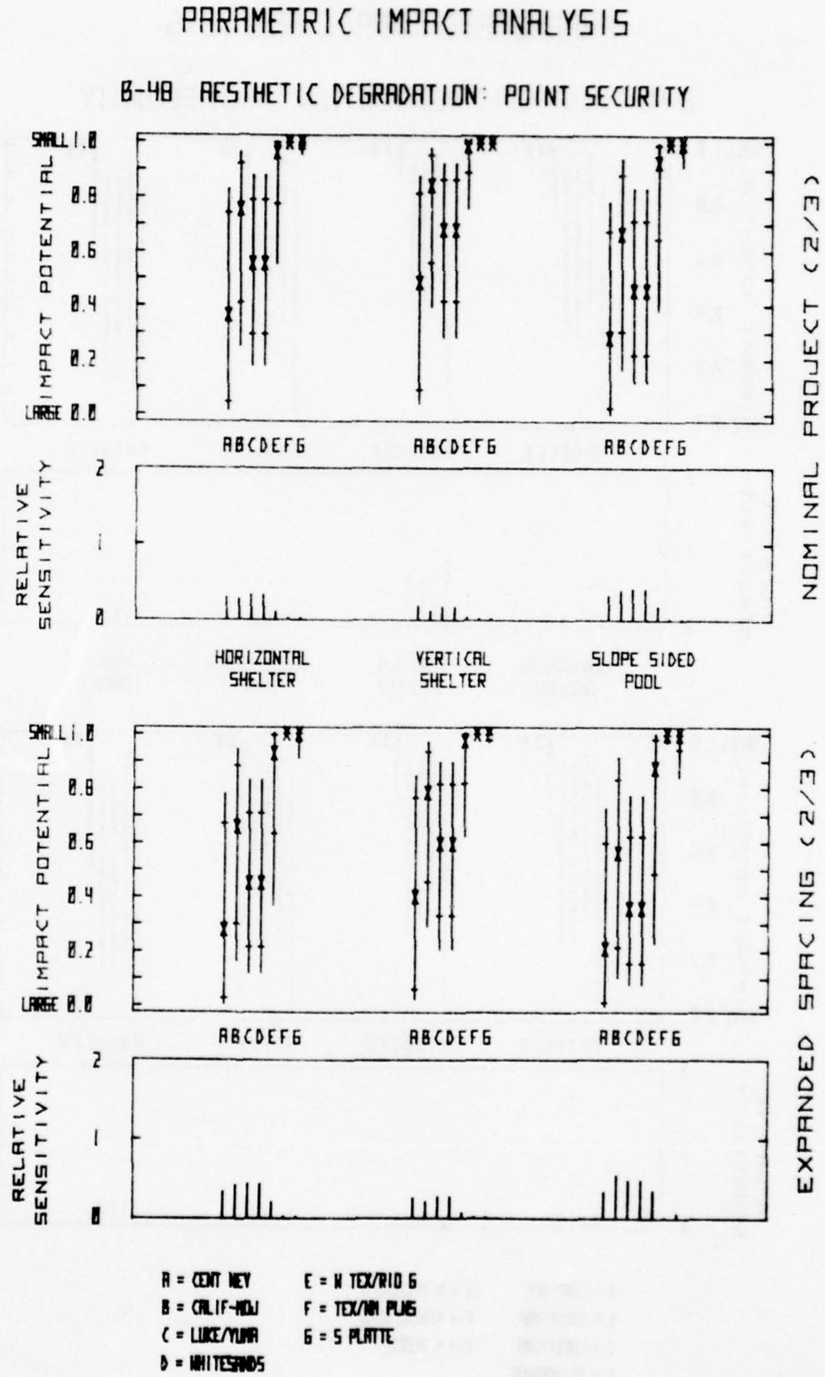

PARAMETRIC IMPACT ANALYSIS
B-48 AESTHETIC DEGRADATION: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-210

PARAMETRIC IMPACT ANALYSIS

B-48 AESTHETIC DEGRADATION: AREA SECURITY

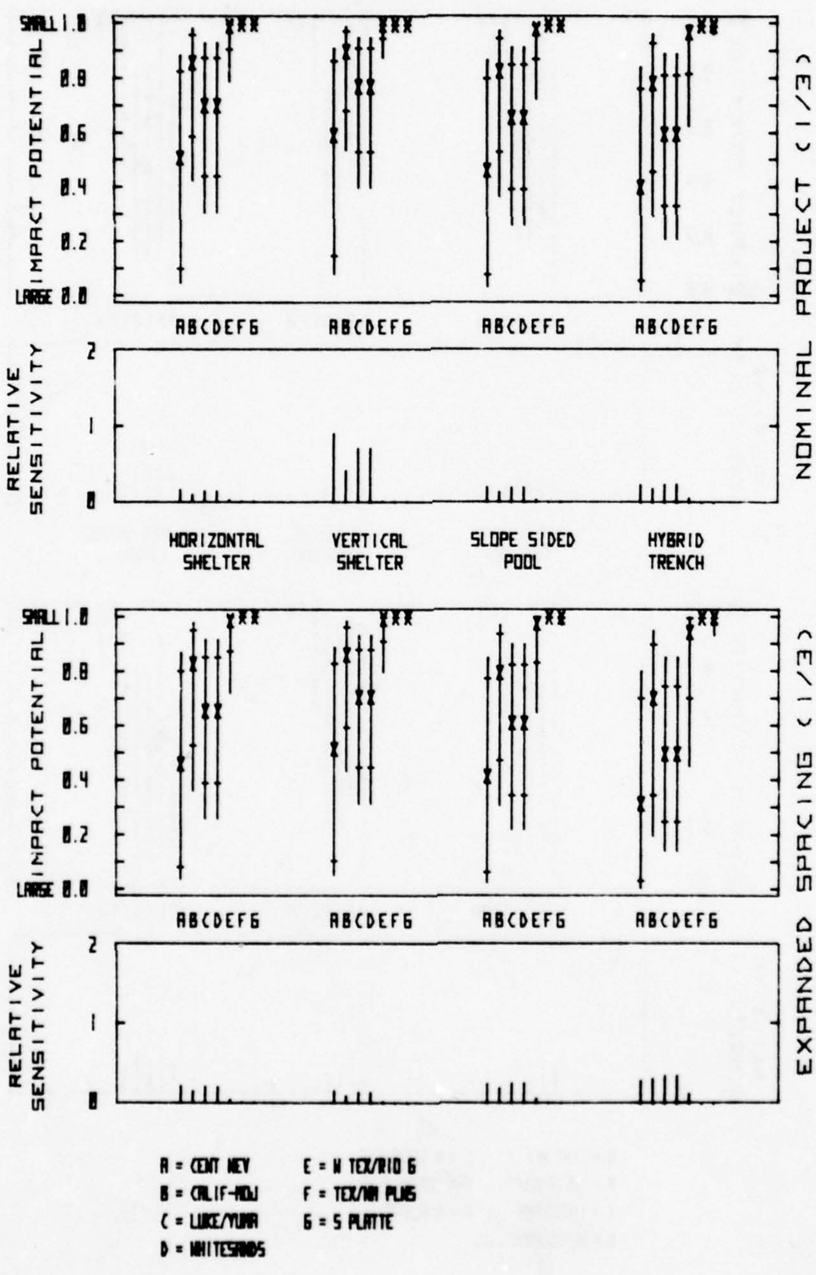


Figure B-211

PARAMETRIC IMPACT ANALYSIS

B-48 AESTHETIC DEGRADATION: POINT SECURITY

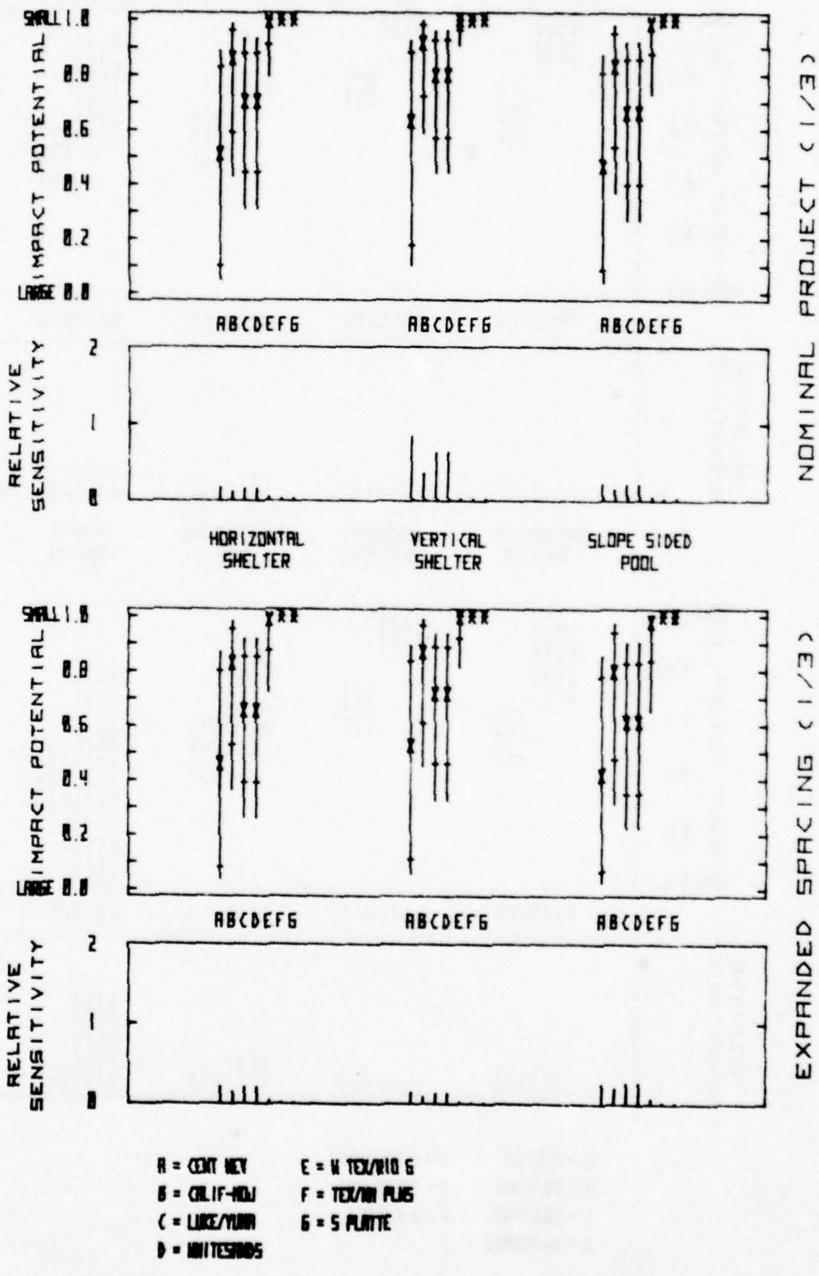


Figure B-212

PARAMETRIC IMPACT ANALYSIS

B-49: WATER EROSION POTENTIAL: AREA SECURITY

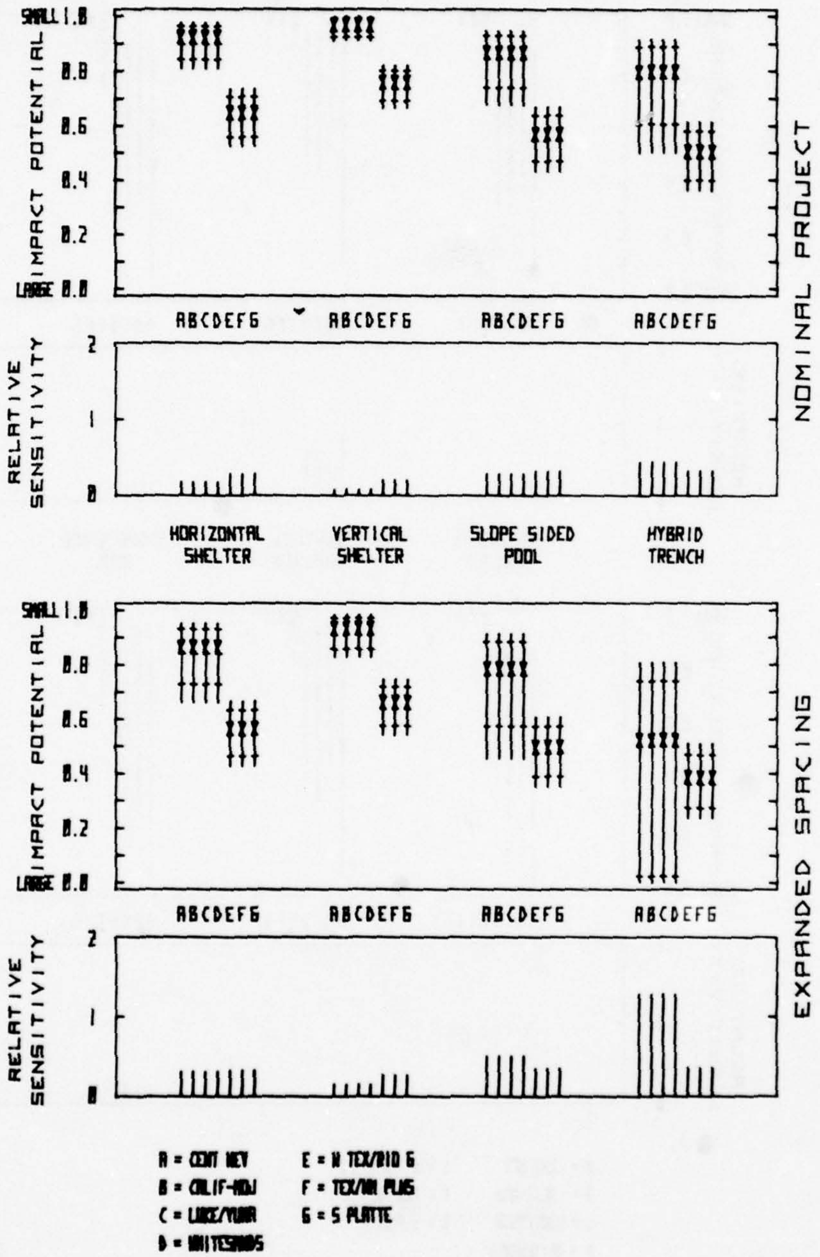
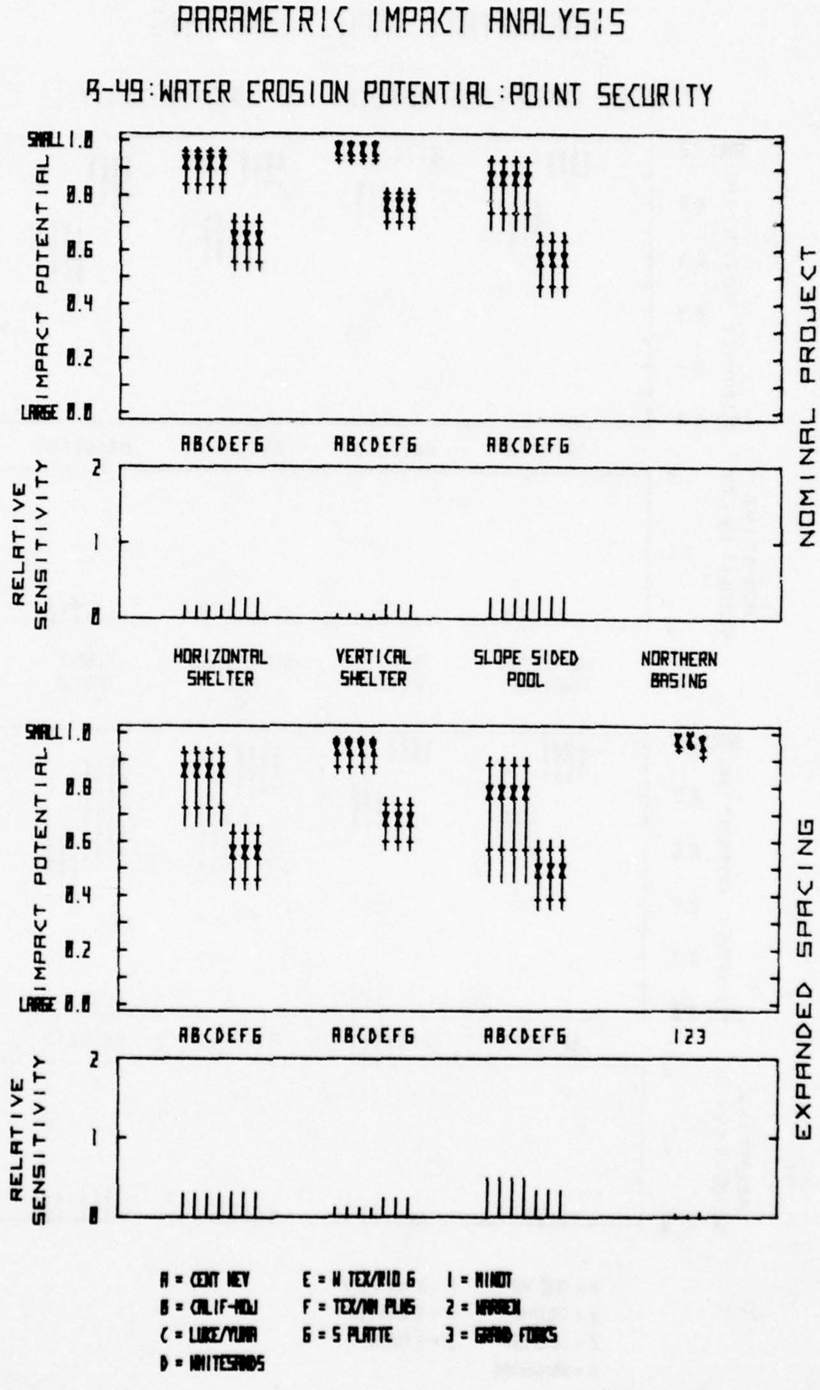


Figure B-213



PARAMETRIC IMPACT ANALYSIS
B-49: WATER EROSION POTENTIAL: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-214

PARAMETRIC IMPACT ANALYSIS

B-49 WATER EROSION POTENTIAL: AREA SECURITY

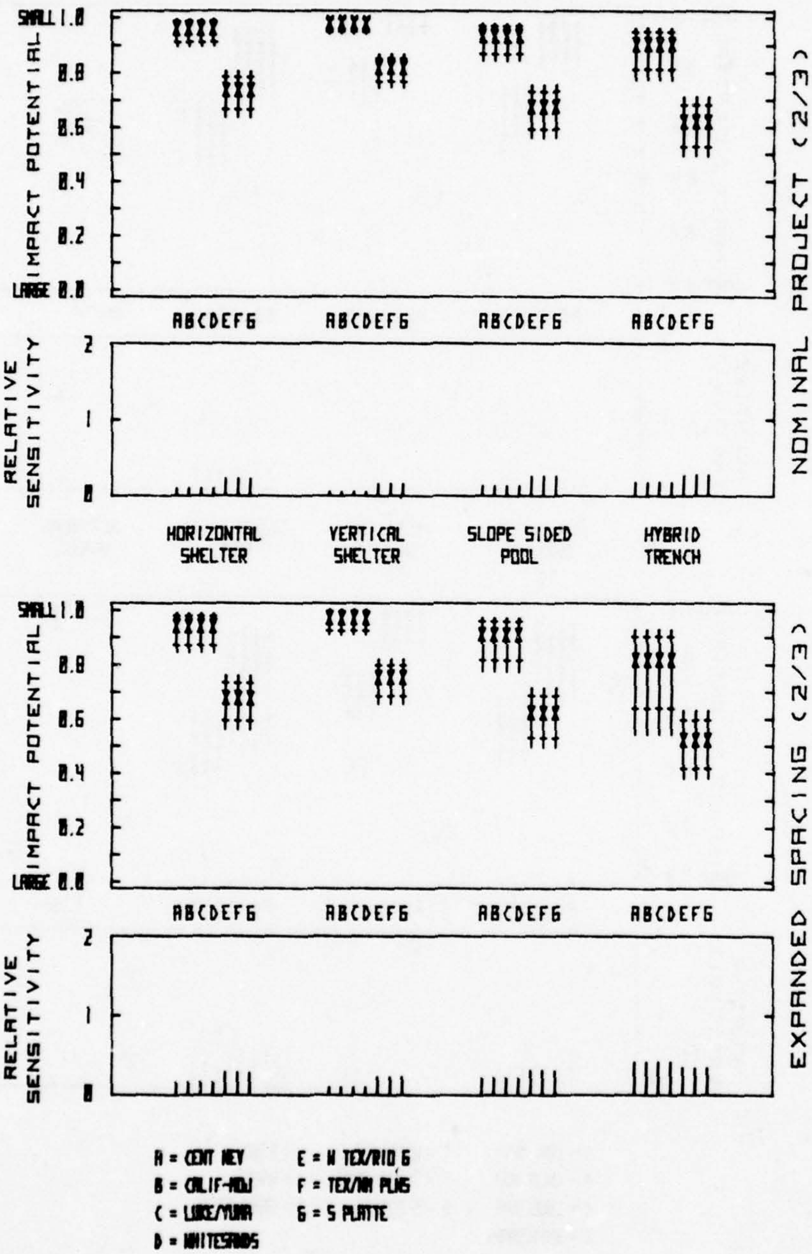


Figure B-215

PARAMETRIC IMPACT ANALYSIS

B-49 WATER EROSION POTENTIAL: POINT SECURITY

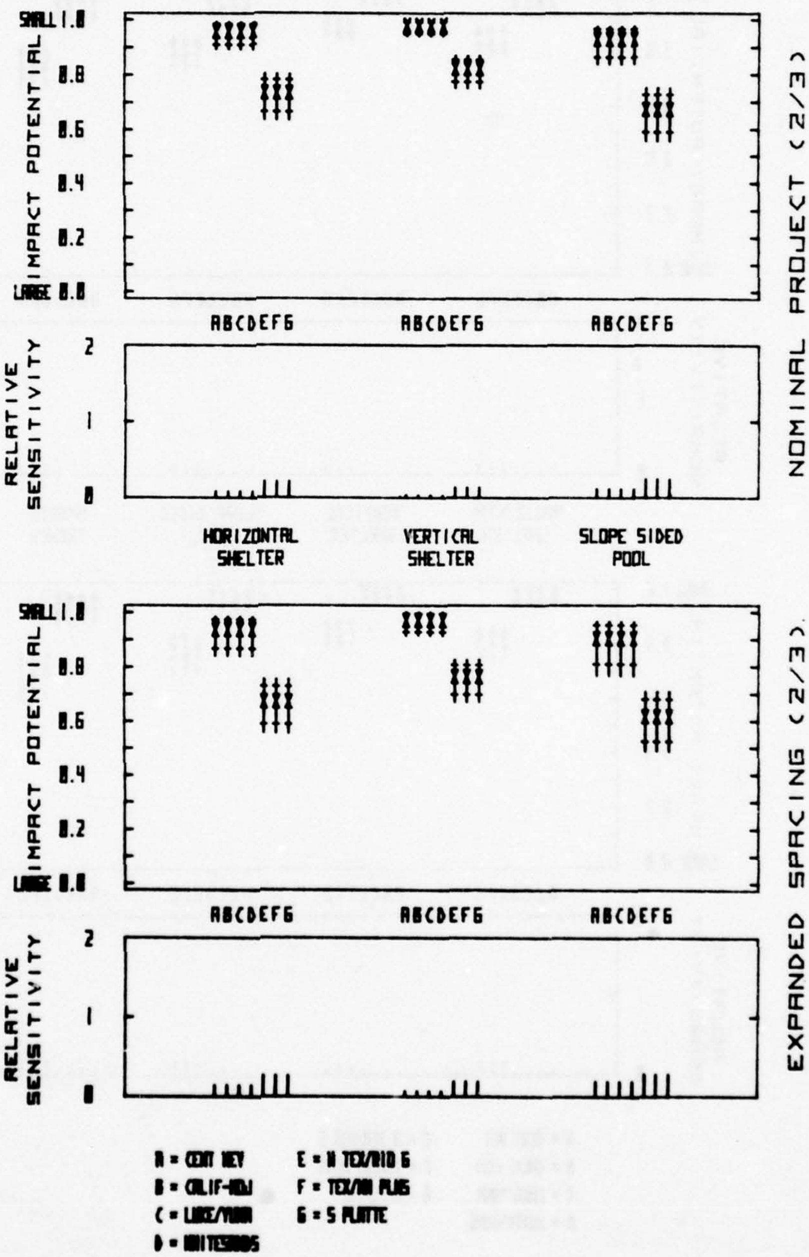


Figure B-216

PARAMETRIC IMPACT ANALYSIS

B-49 WATER EROSION POTENTIAL: AREA SECURITY

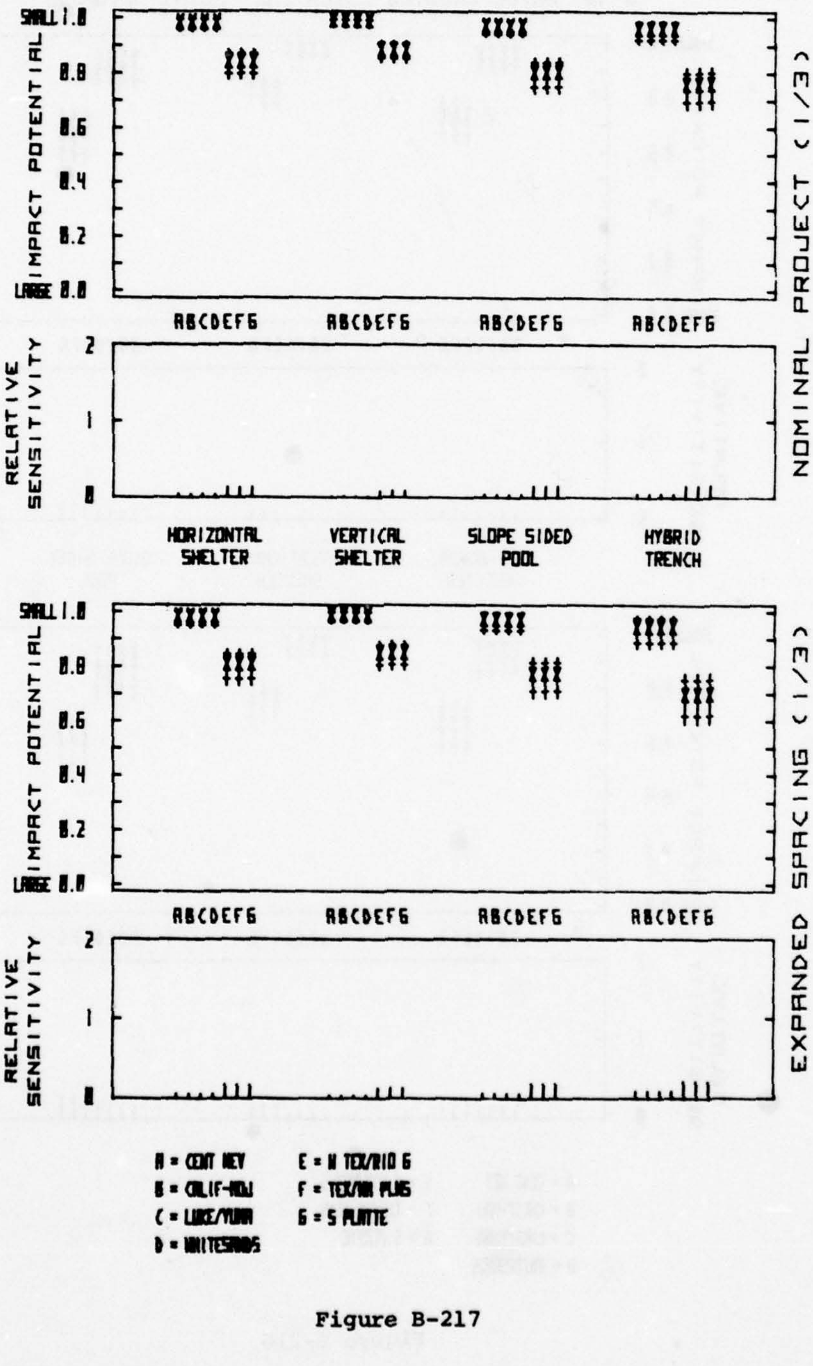


Figure B-217

PARAMETRIC IMPACT ANALYSIS

B-49 WATER EROSION POTENTIAL: POINT SECURITY

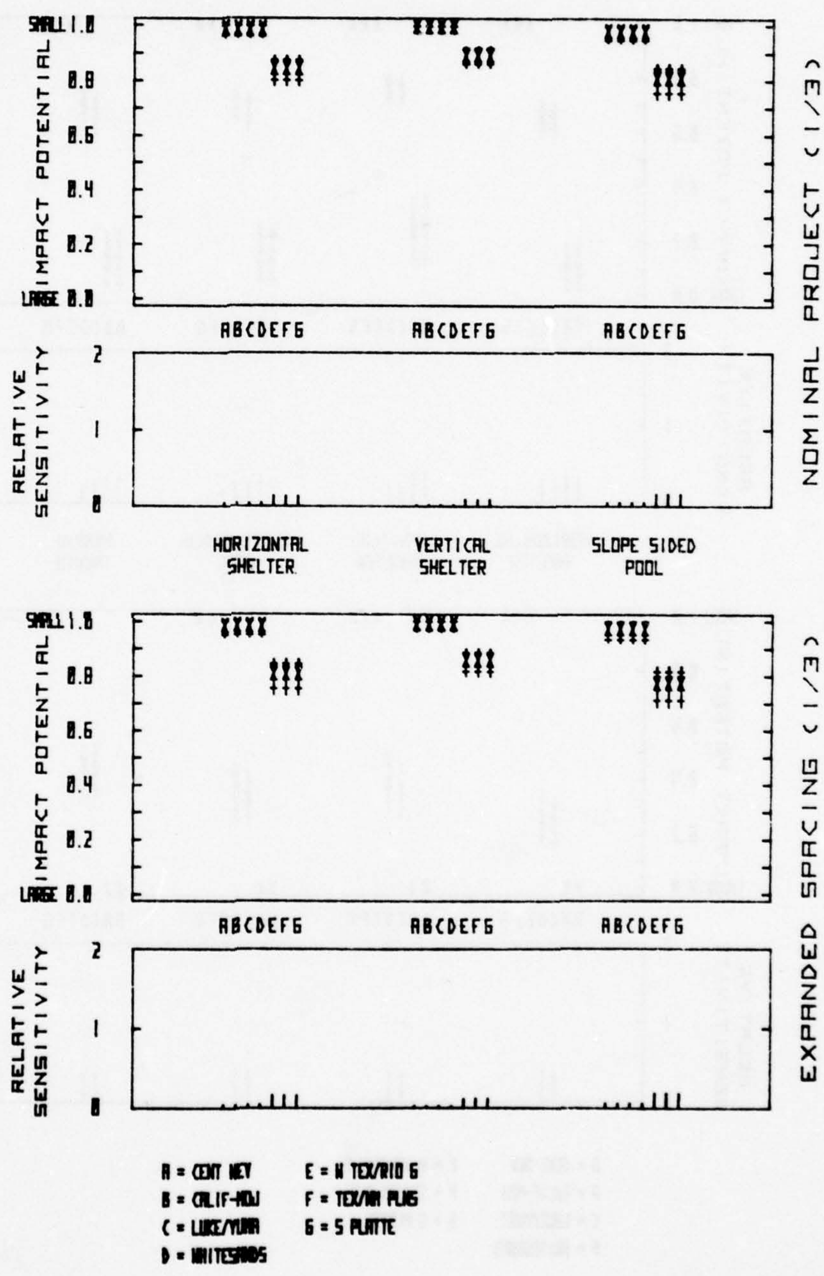


Figure B-218

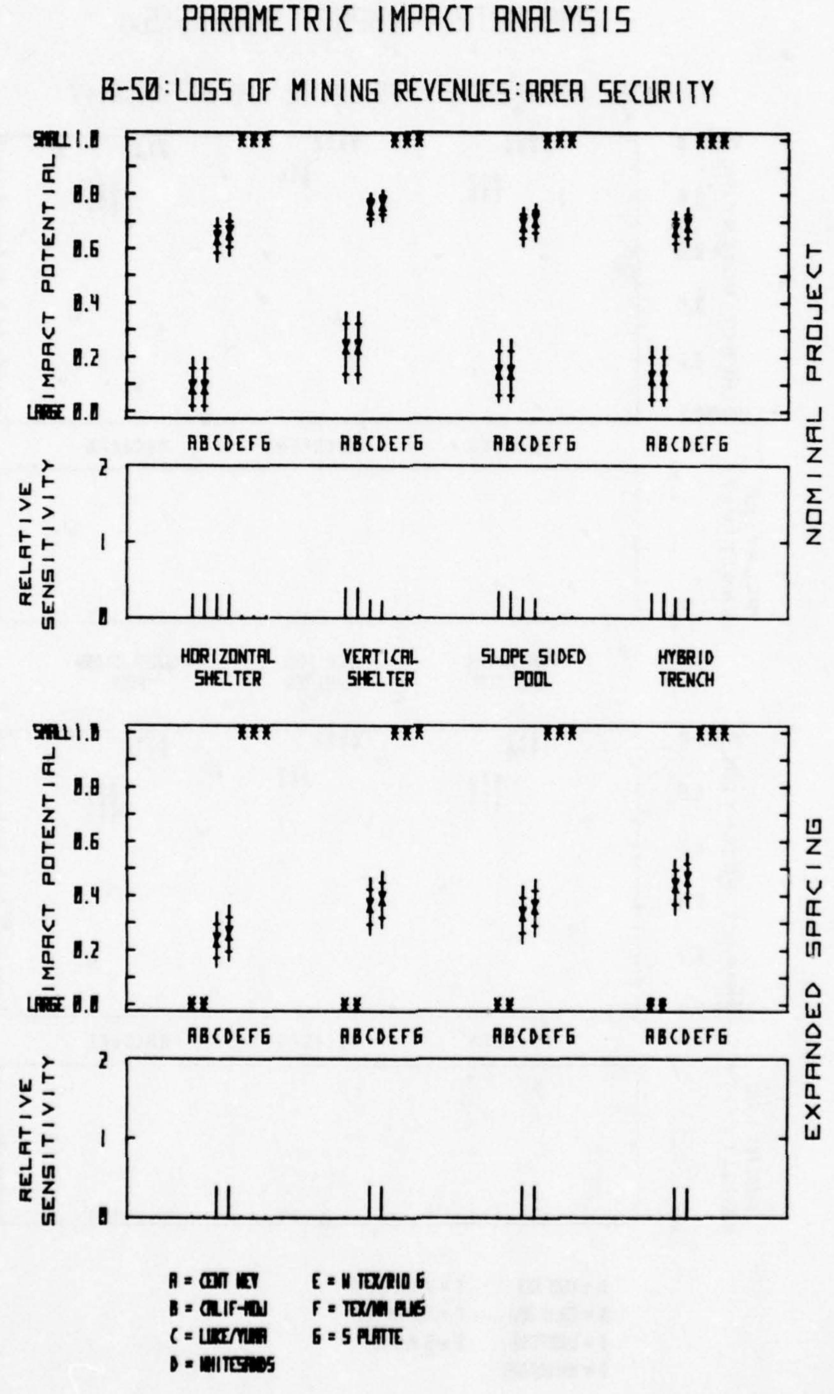

PARAMETRIC IMPACT ANALYSIS
B-50:LOSS OF MINING REVENUES:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-219

PARAMETRIC IMPACT ANALYSIS

B-50:LOSS OF MINING REVENUES:POINT SECURITY

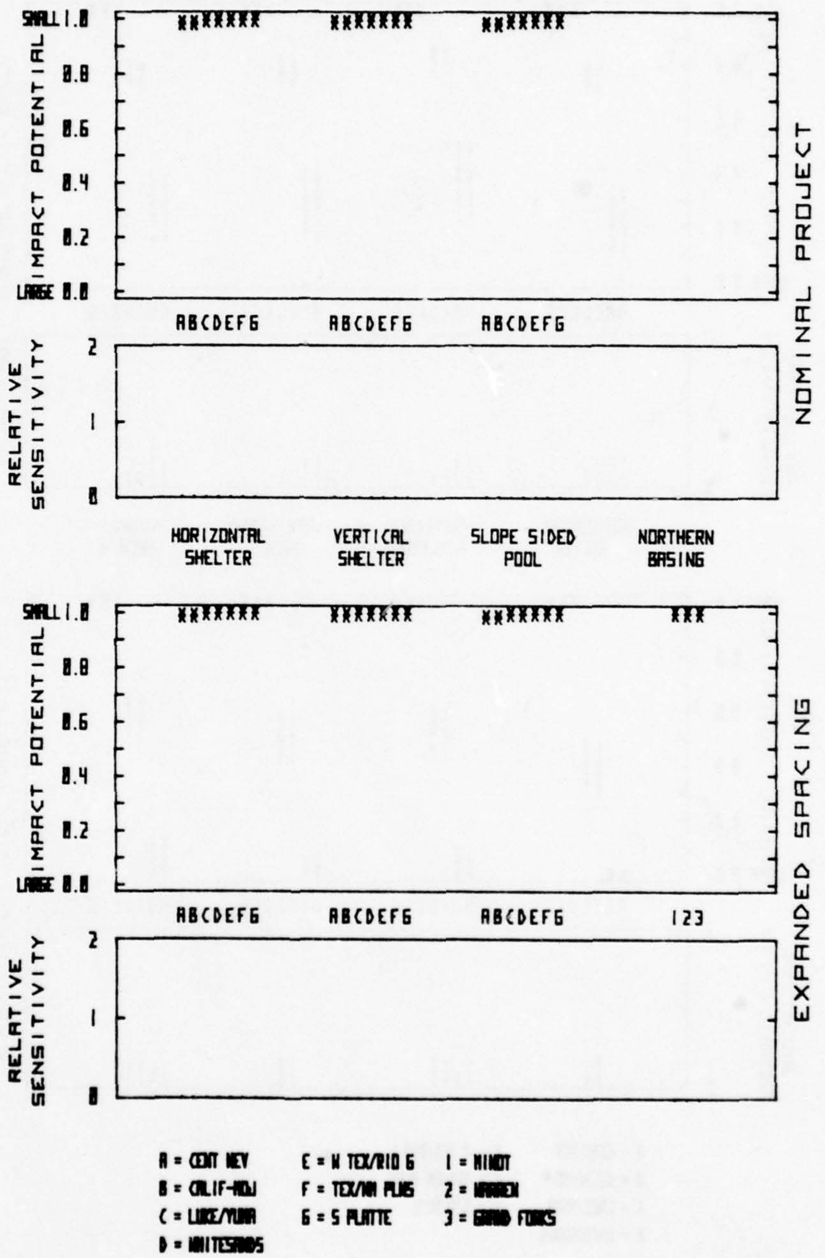


Figure B-220

PARAMETRIC IMPACT ANALYSIS

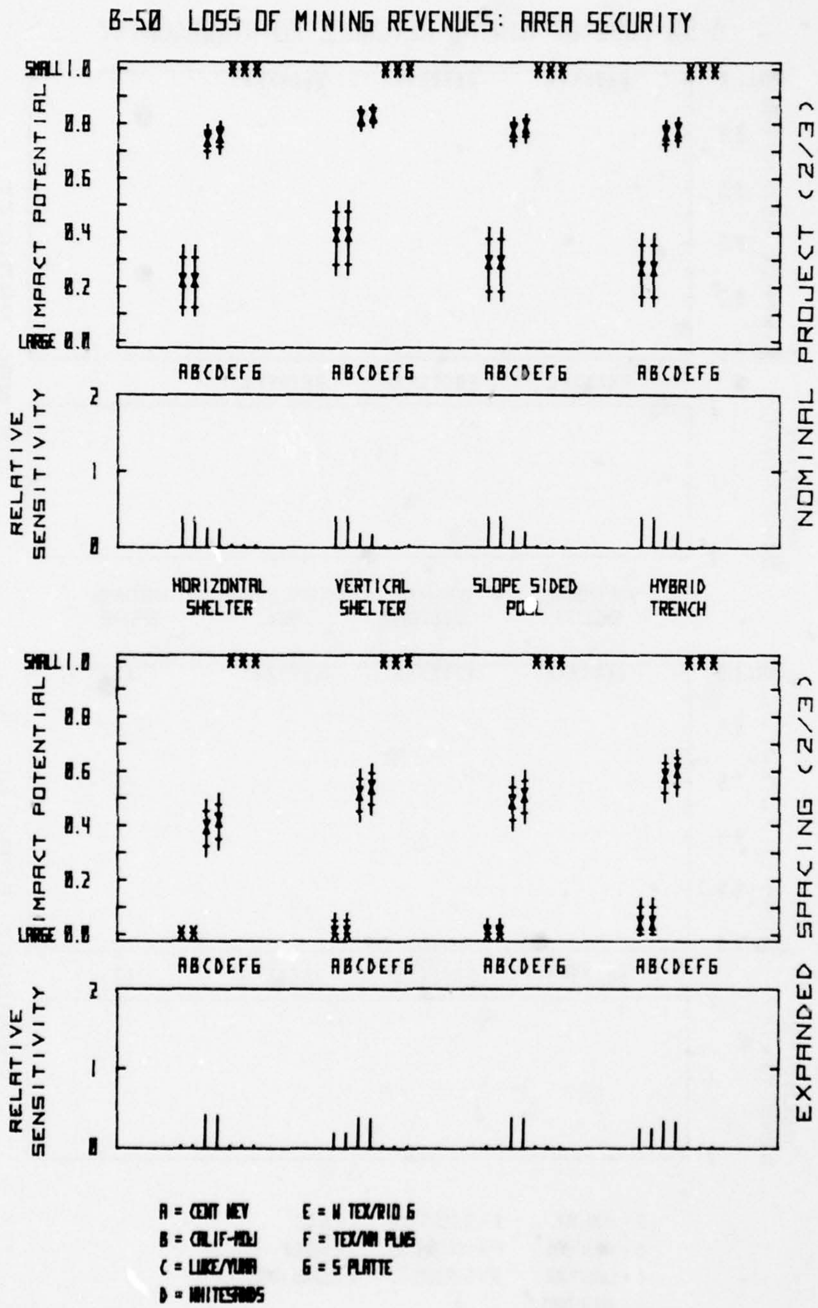


Figure B-221

PARAMETRIC IMPACT ANALYSIS

B-50 LOSS OF MINING REVENUES: POINT SECURITY

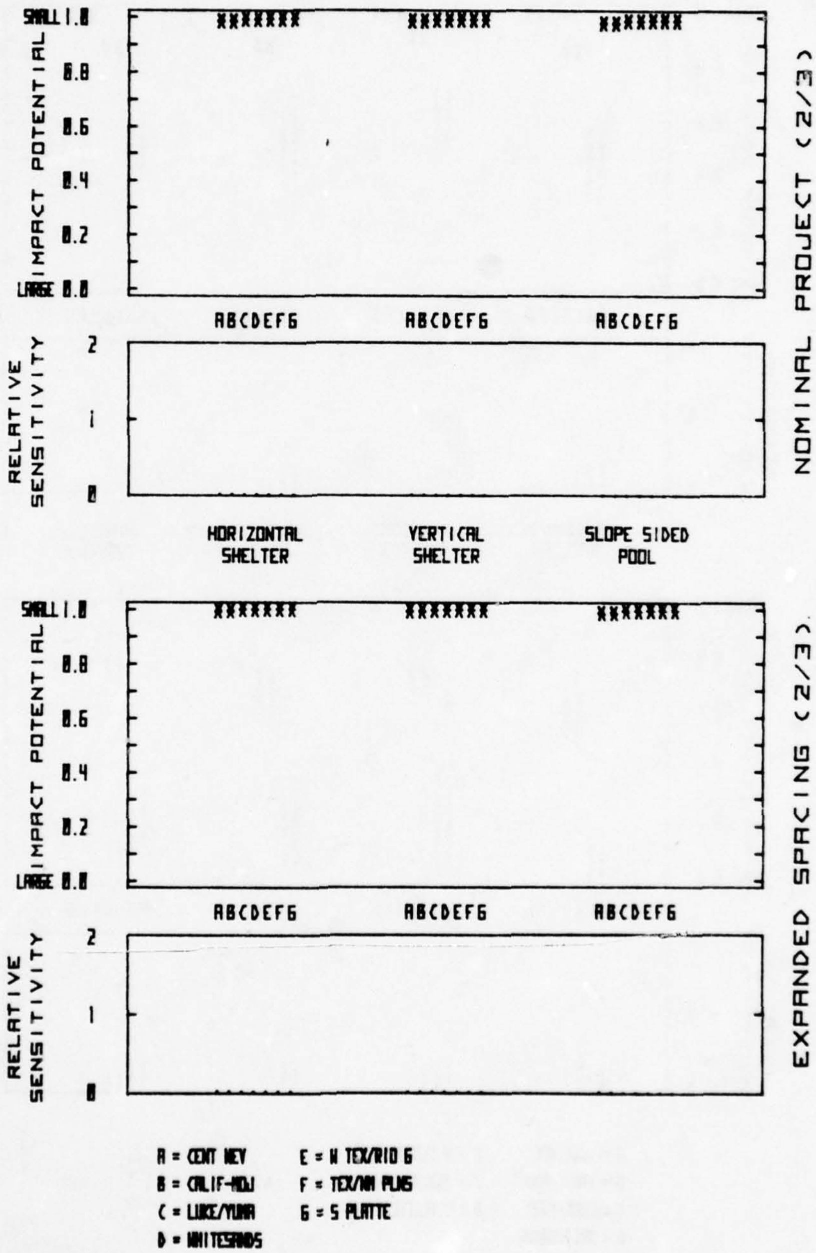


Figure B-222

PARAMETRIC IMPACT ANALYSIS

B-50 LOSS OF MINING REVENUES: AREA SECURITY

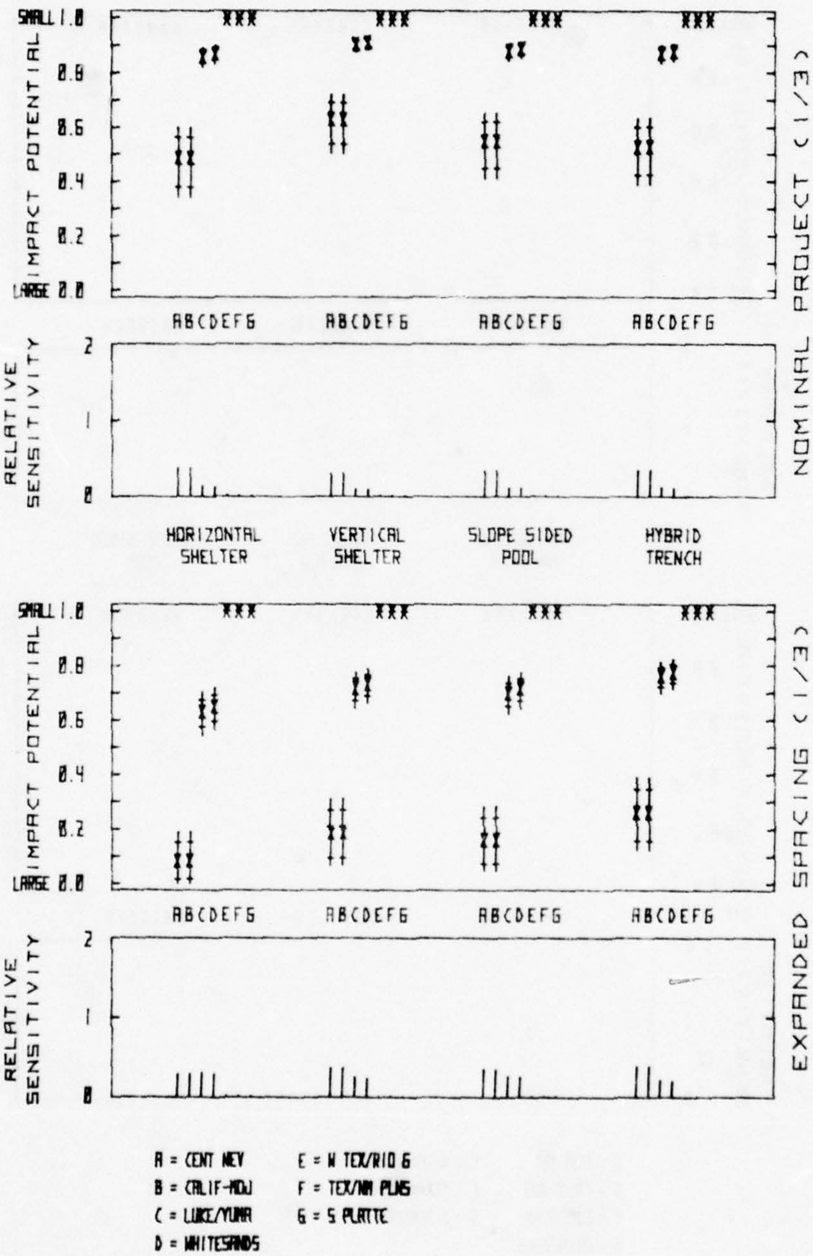


Figure B-223

PARAMETRIC IMPACT ANALYSIS

B-50 LOSS OF MINING REVENUES: POINT SECURITY

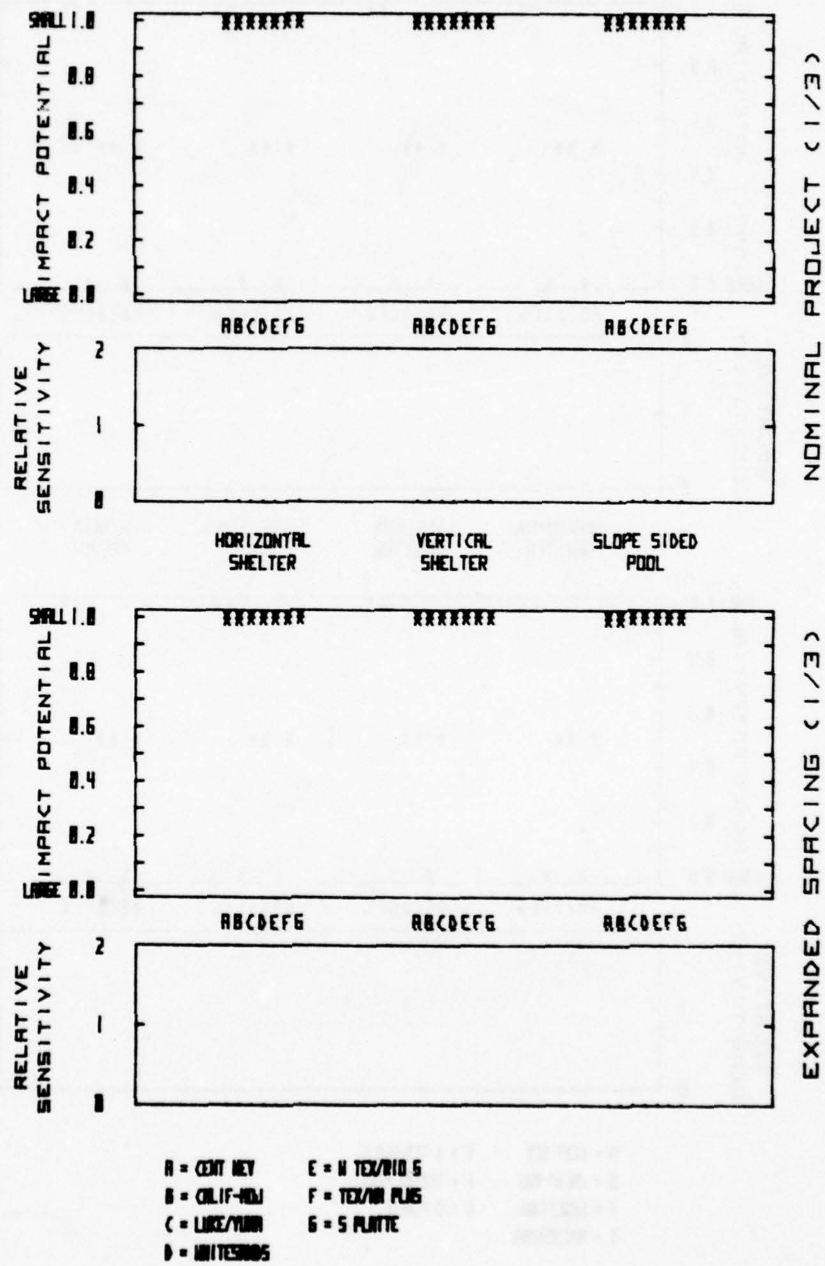


Figure B-224

PARAMETRIC IMPACT ANALYSIS

B-52:PUBLIC NON-DOD LAND REQUIRED:AREA SECURITY

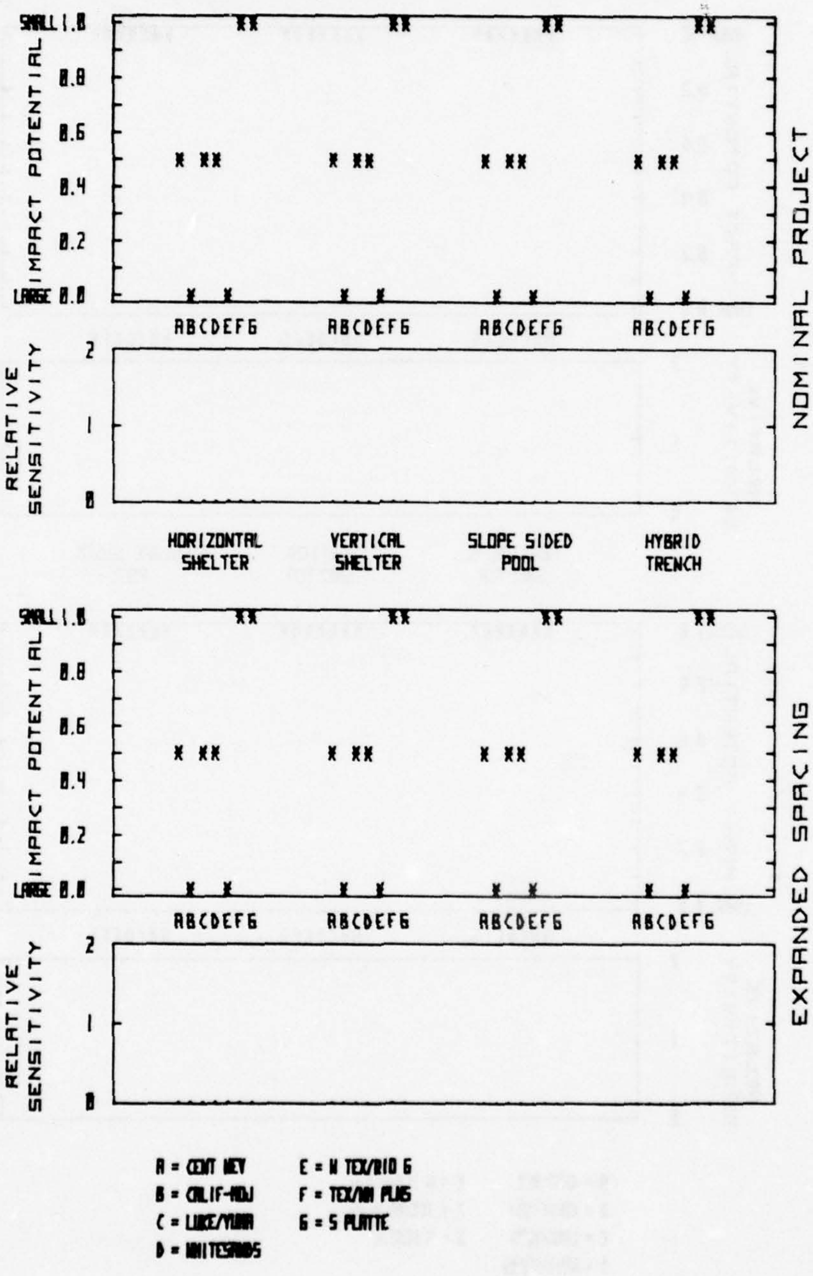


Figure B-225

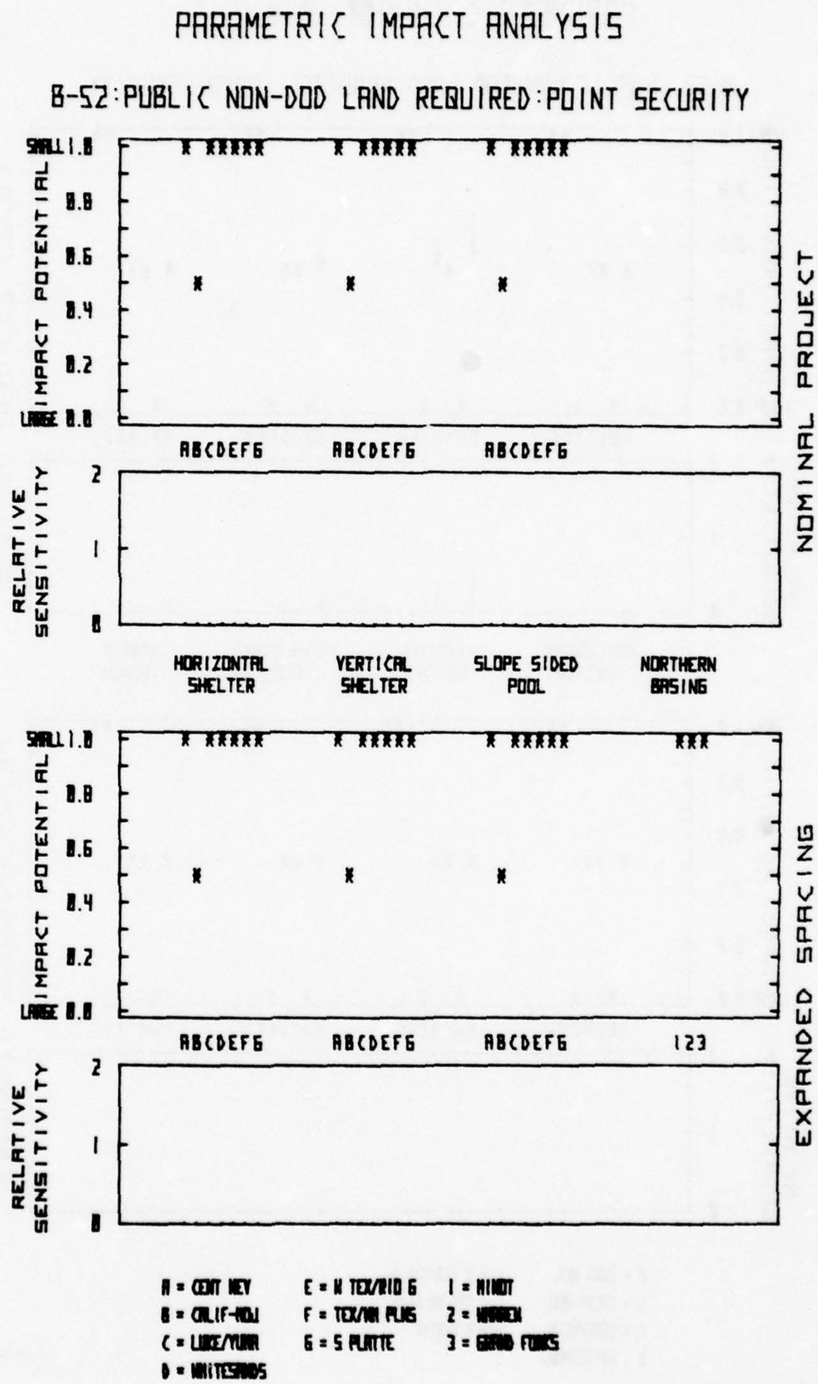

PARAMETRIC IMPACT ANALYSIS
B-52:PUBLIC NON-DOD LAND REQUIRED:POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = N TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-226

PARAMETRIC IMPACT ANALYSIS

B-52 PUBLIC NON-DOD LAND REQUIRED: AREA SECURITY

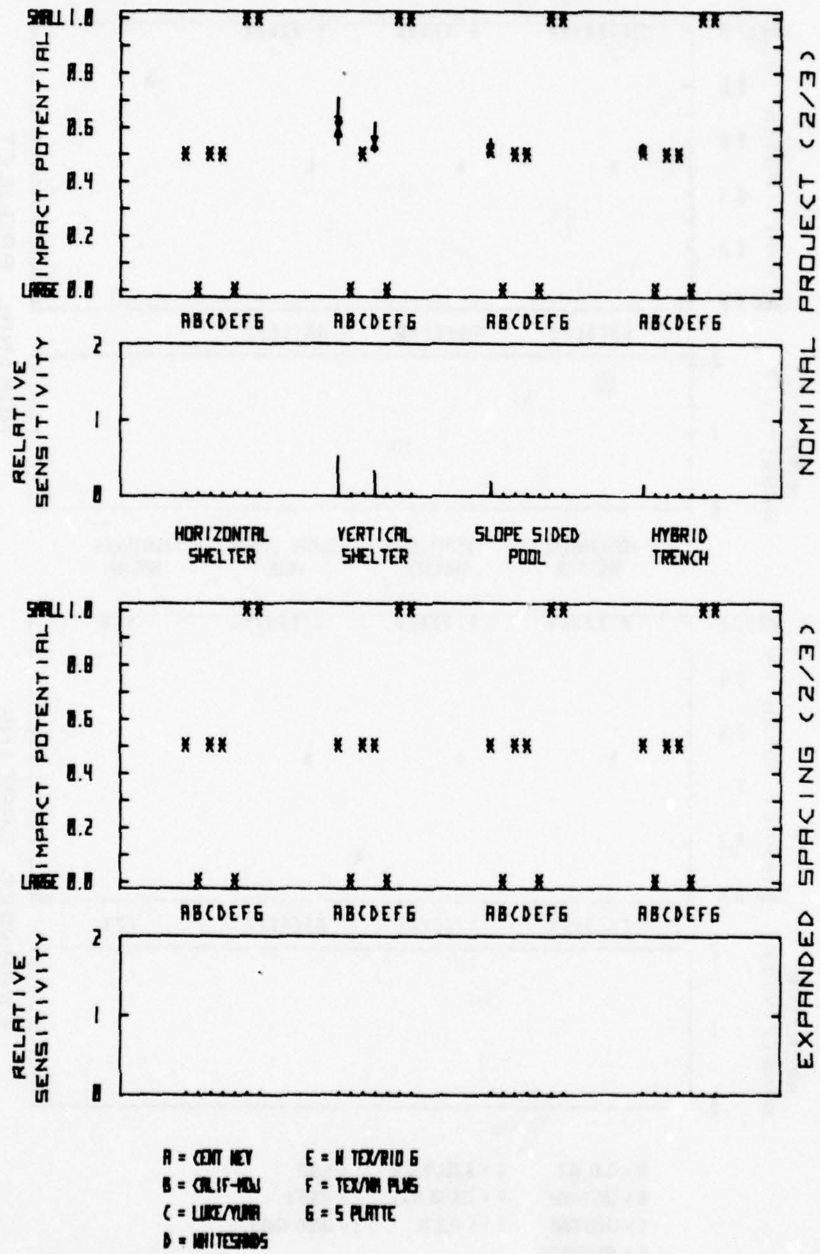


Figure B-227

PARAMETRIC IMPACT ANALYSIS

B-52 PUBLIC NON-DOD LAND REQUIRED: POINT SECURITY

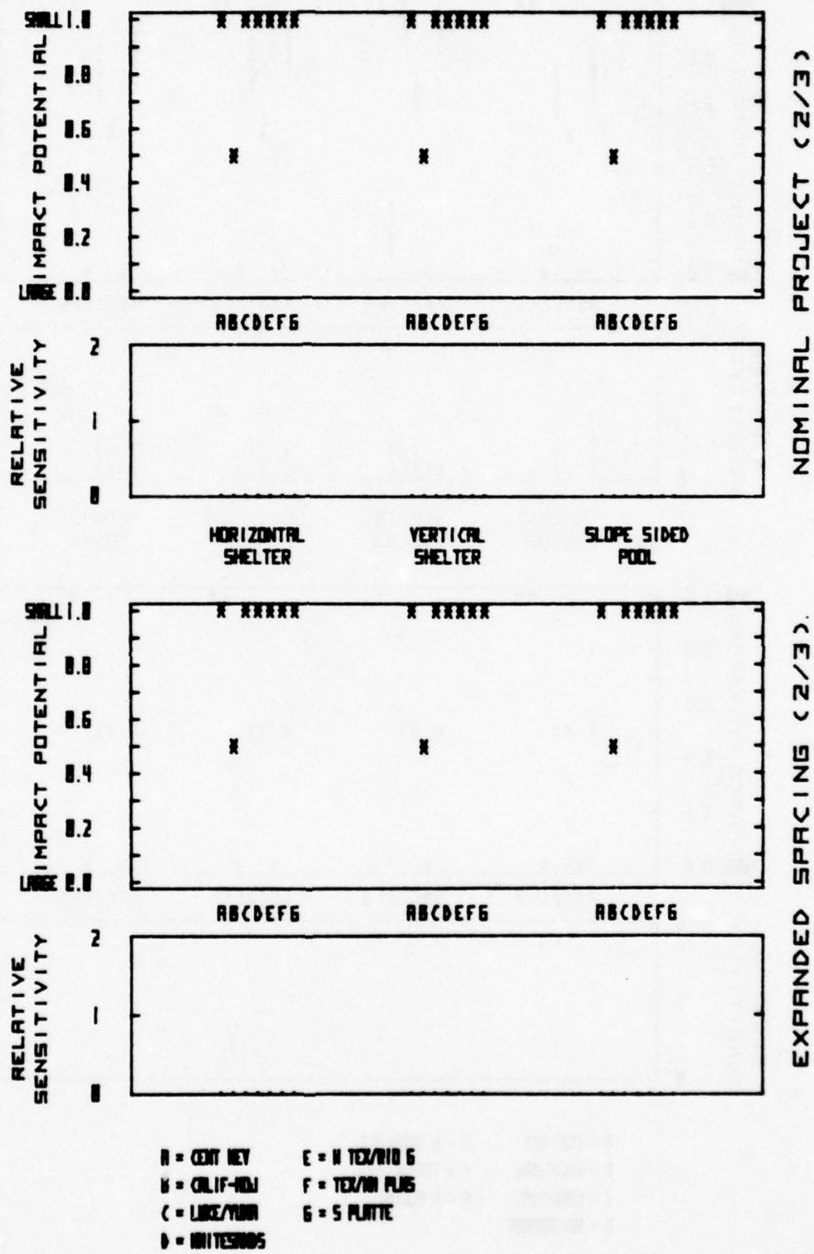


Figure B-228

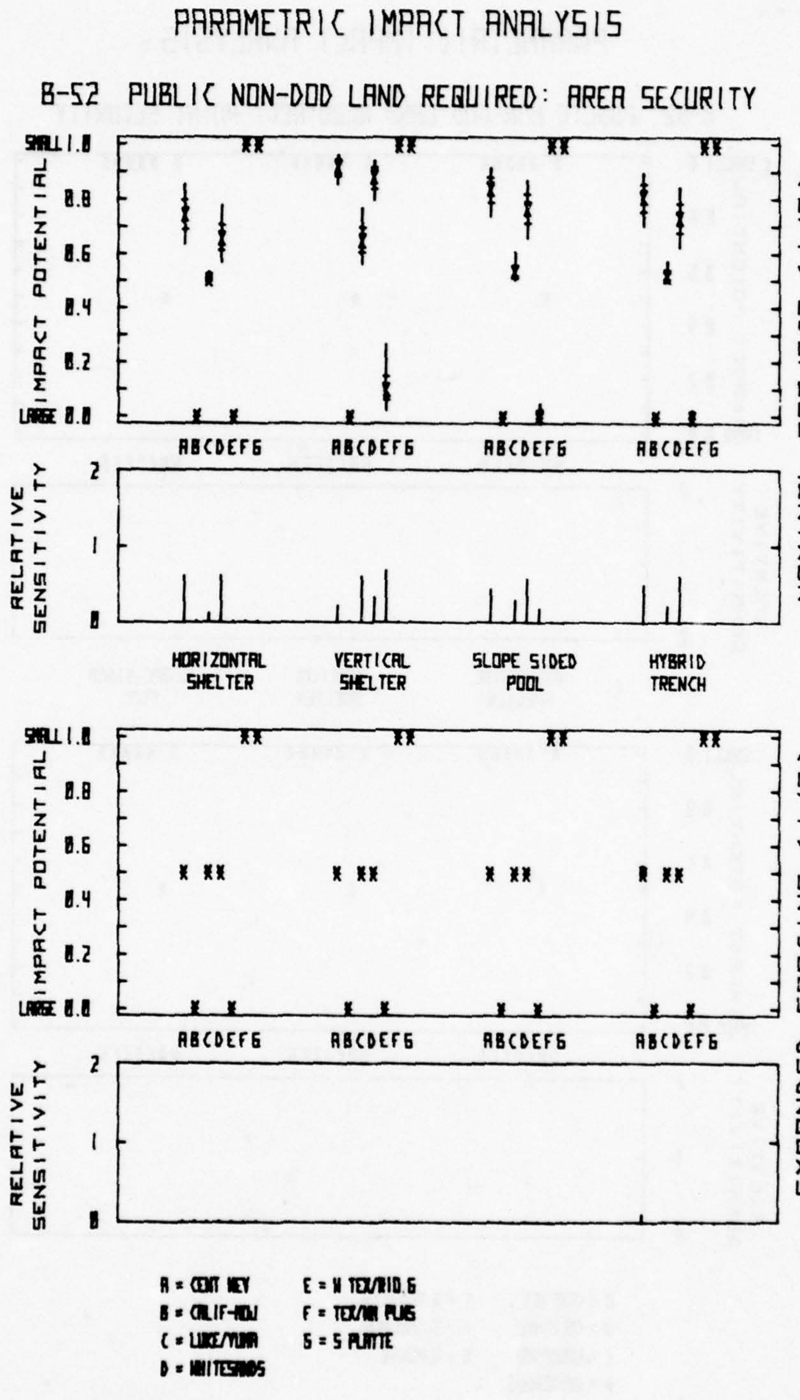

PARAMETRIC IMPACT ANALYSIS
B-52 PUBLIC NON-DOD LAND REQUIRED: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-229

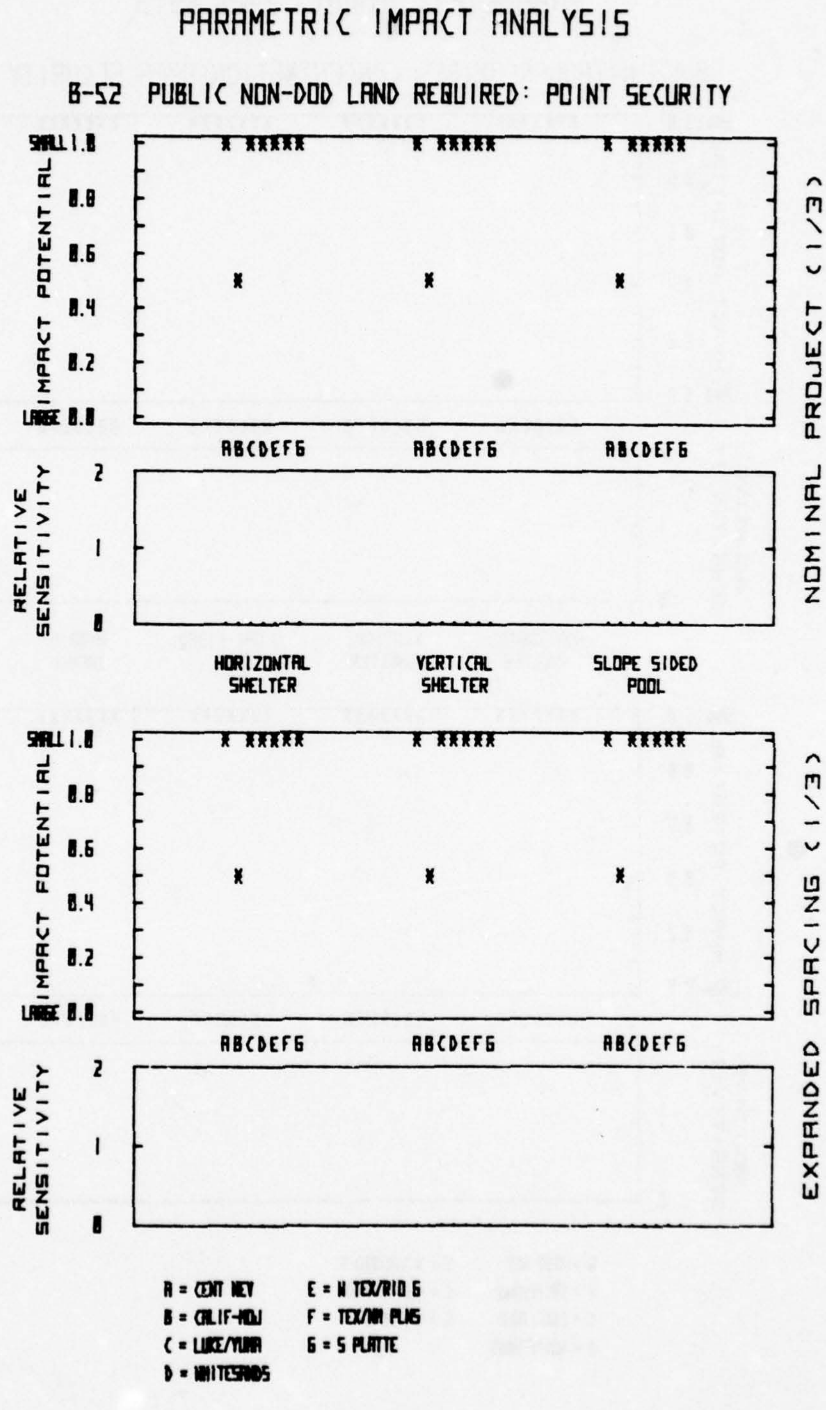

PARAMETRIC IMPACT ANALYSIS
B-52 PUBLIC NON-DOD LAND REQUIRED: POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NOMINAL PROJECT (1/3)
EXPANDED SPACING (1/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-230

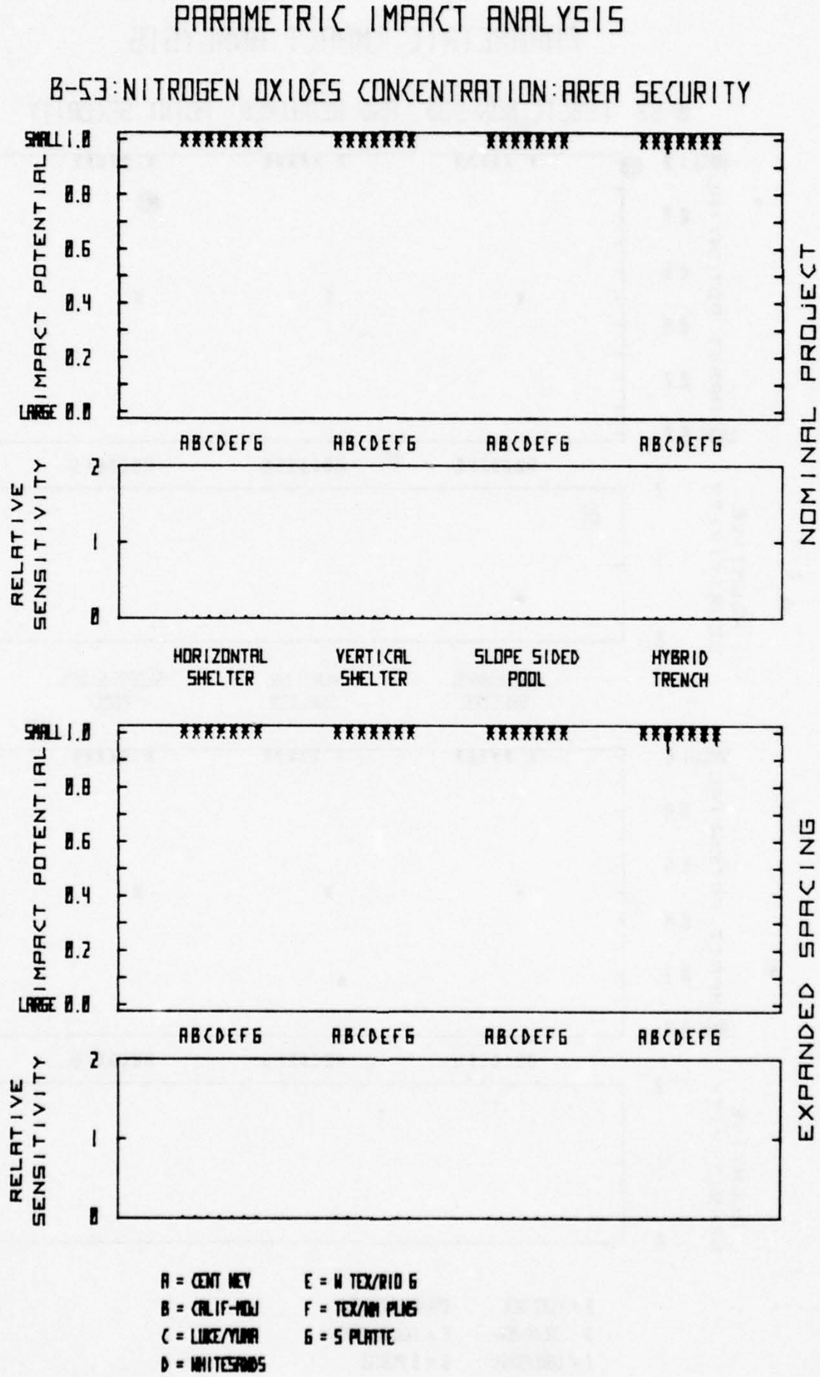

PARAMETRIC IMPACT ANALYSIS
B-53:NITROGEN OXIDES CONCENTRATION:AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG ABCDEFG ABCDEFG ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-231

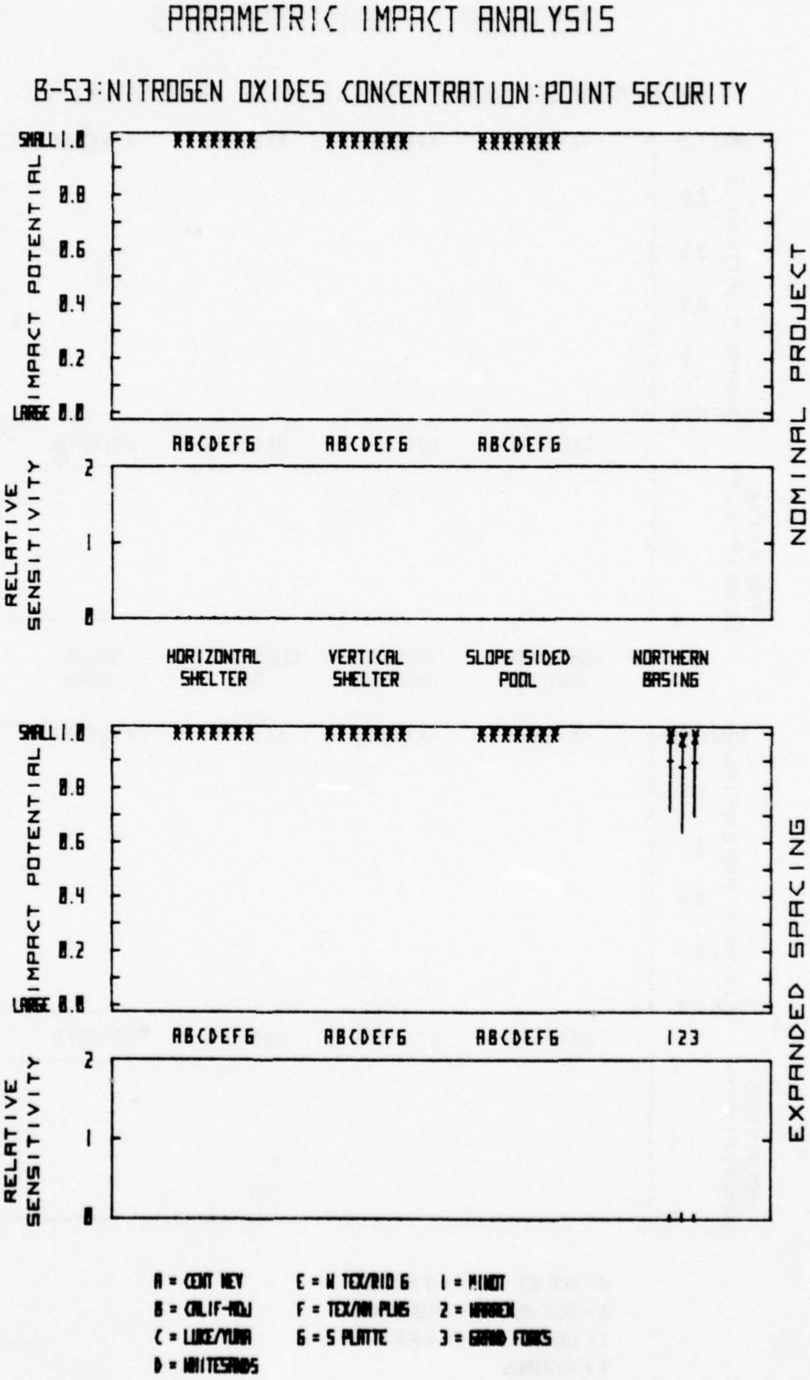

PARAMETRIC IMPACT ANALYSIS
B-53:NITROGEN OXIDES CONCENTRATION:POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG ABCDEFG ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
ABCDEFG ABCDEFG ABCDEFG 123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-232

PARAMETRIC IMPACT ANALYSIS

B-53 NITROGEN OXIDES CONCENTRATION: AREA SECURITY

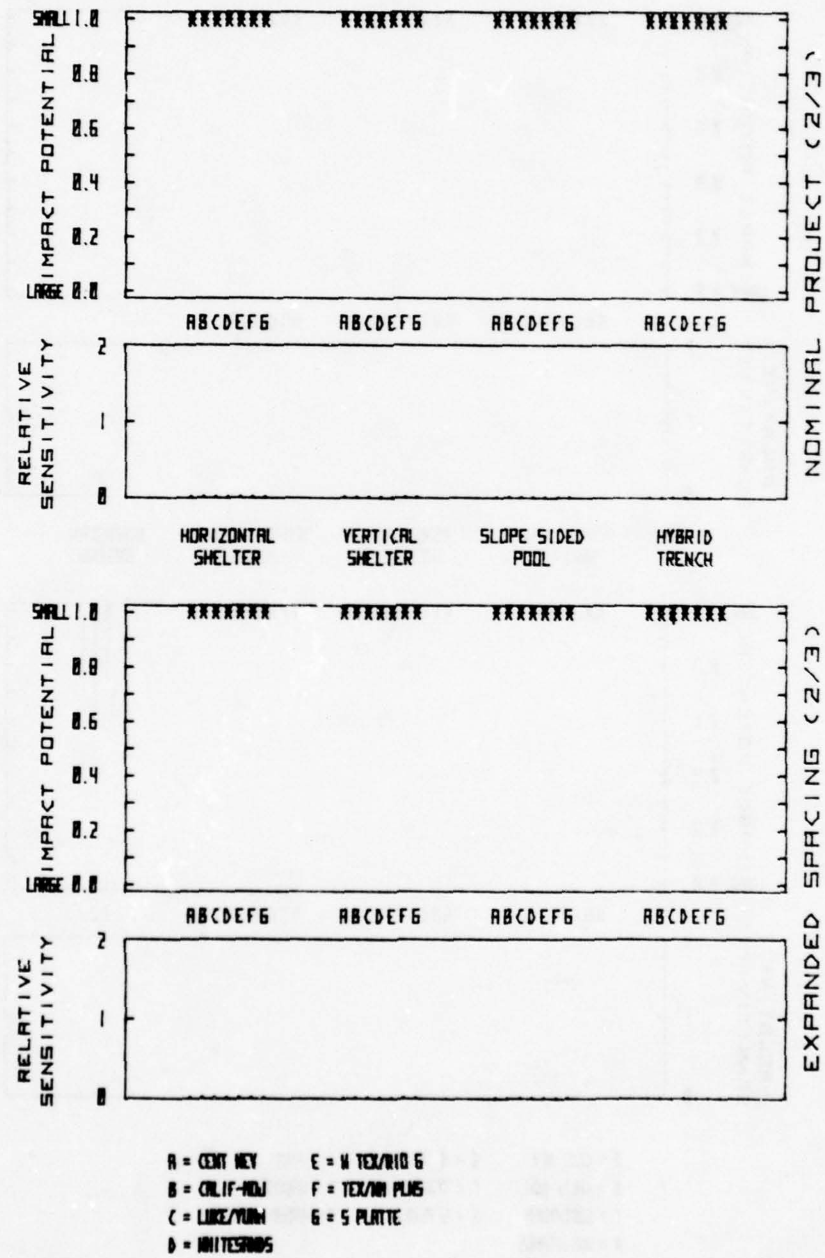


Figure B-233

PARAMETRIC IMPACT ANALYSIS

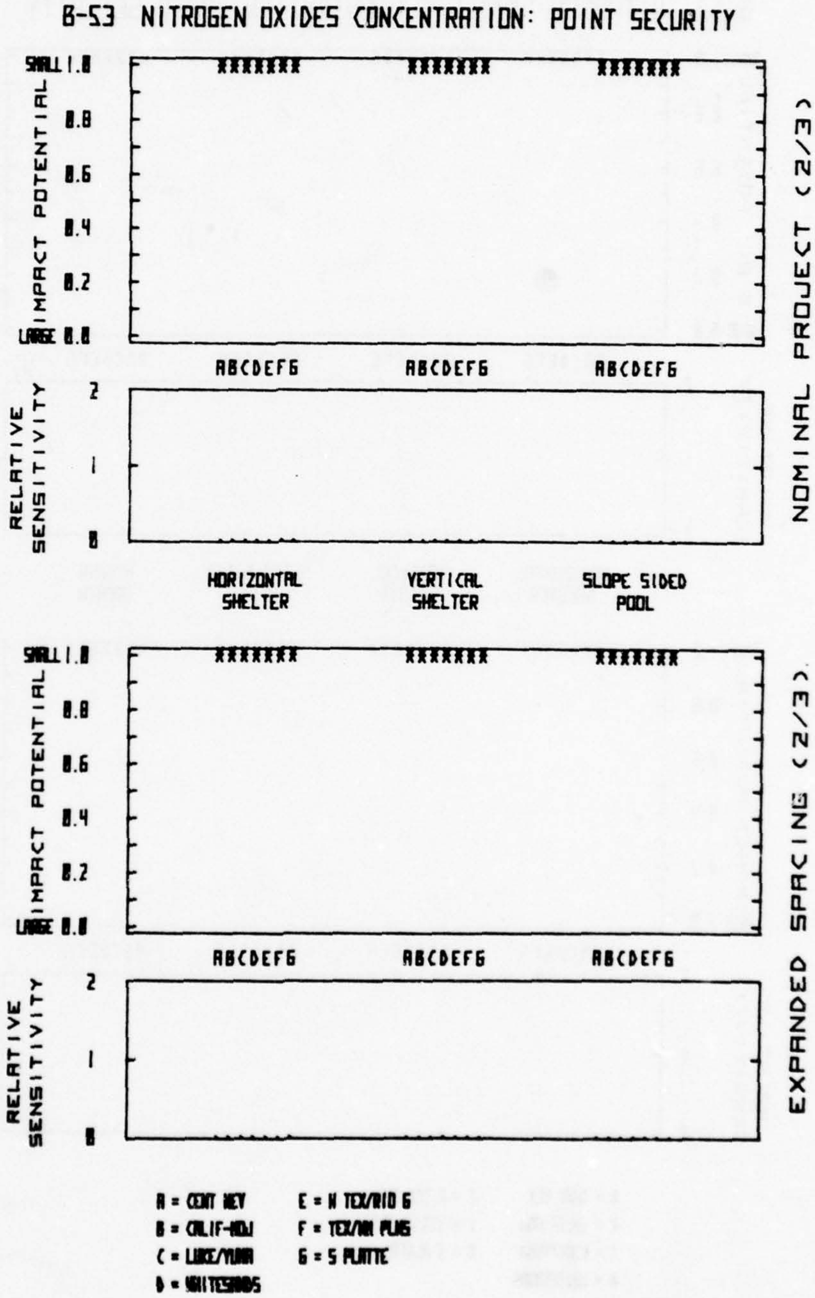


Figure B-234

PARAMETRIC IMPACT ANALYSIS

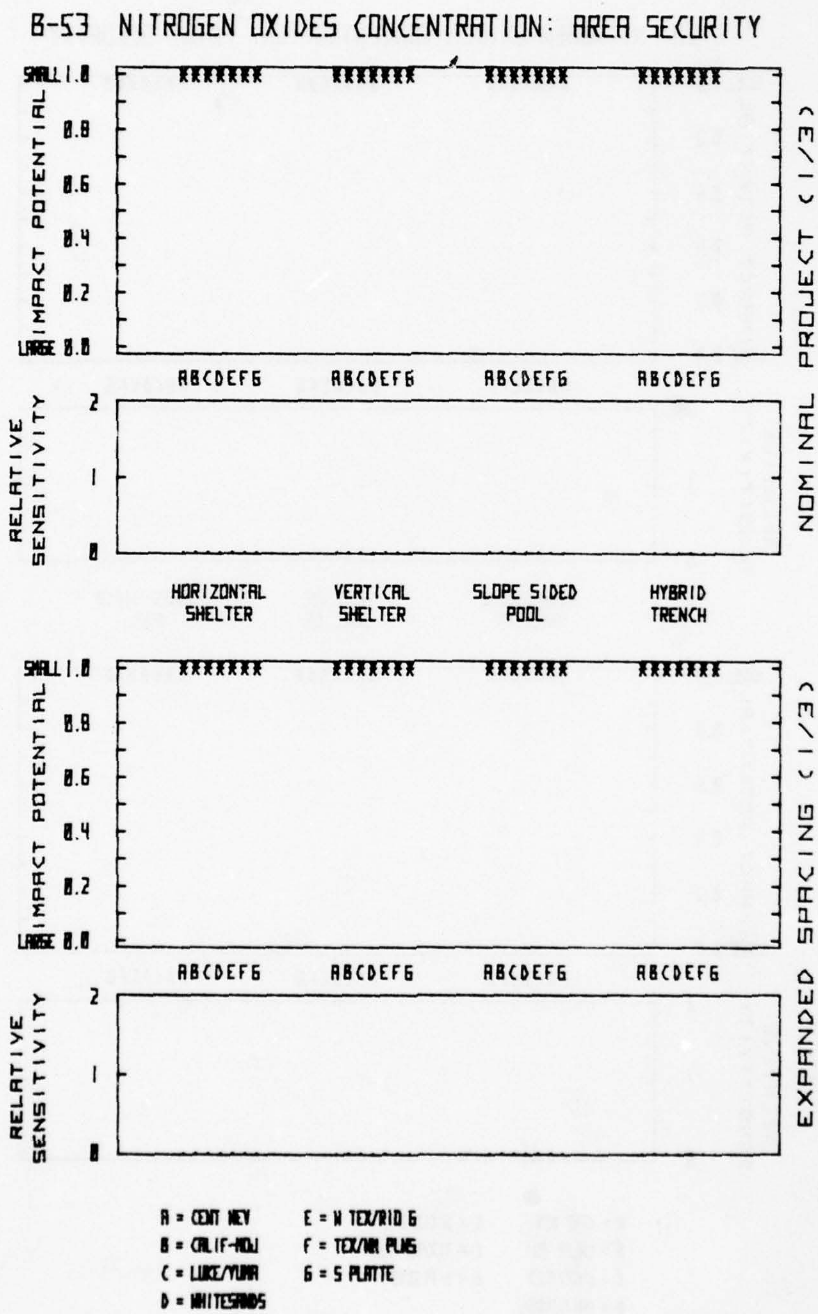


Figure B-235

PARAMETRIC IMPACT ANALYSIS

B-53 NITROGEN OXIDES CONCENTRATION: POINT SECURITY

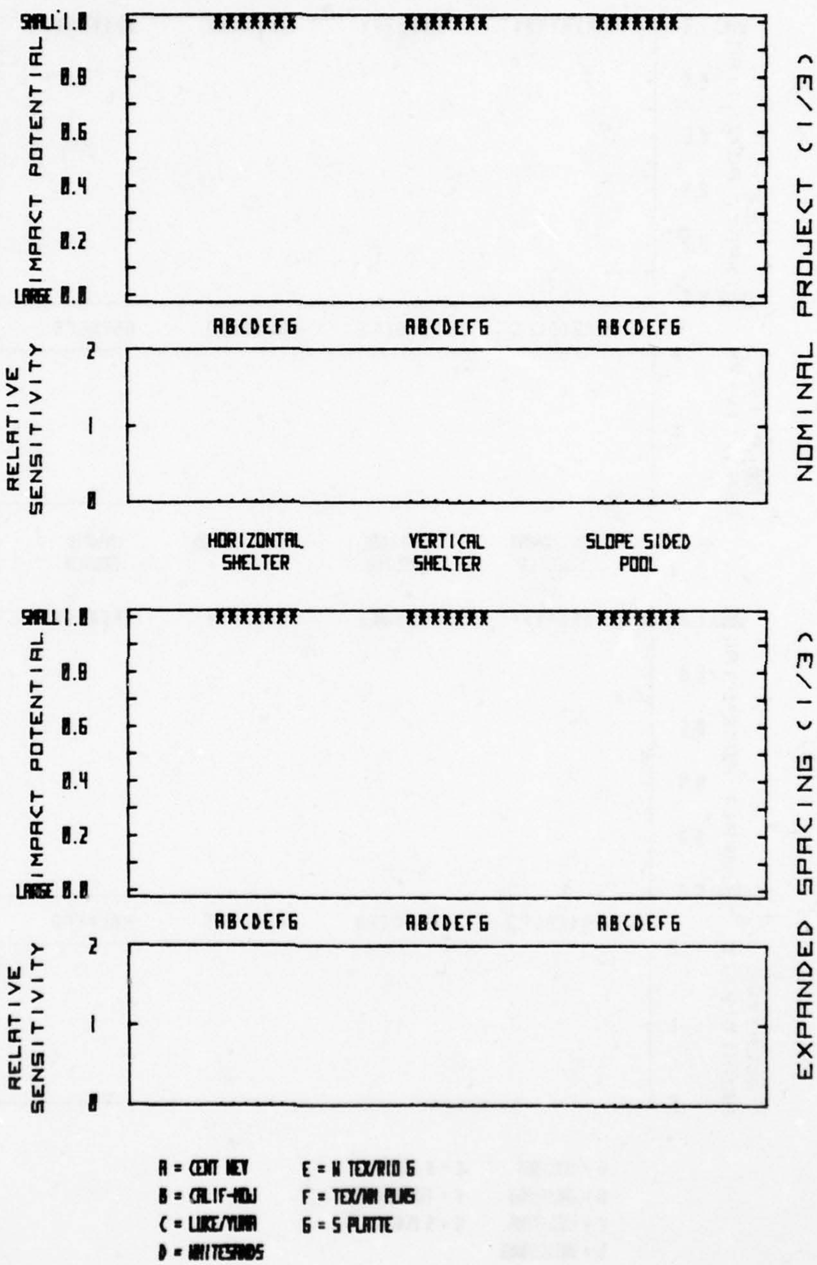


Figure B-236

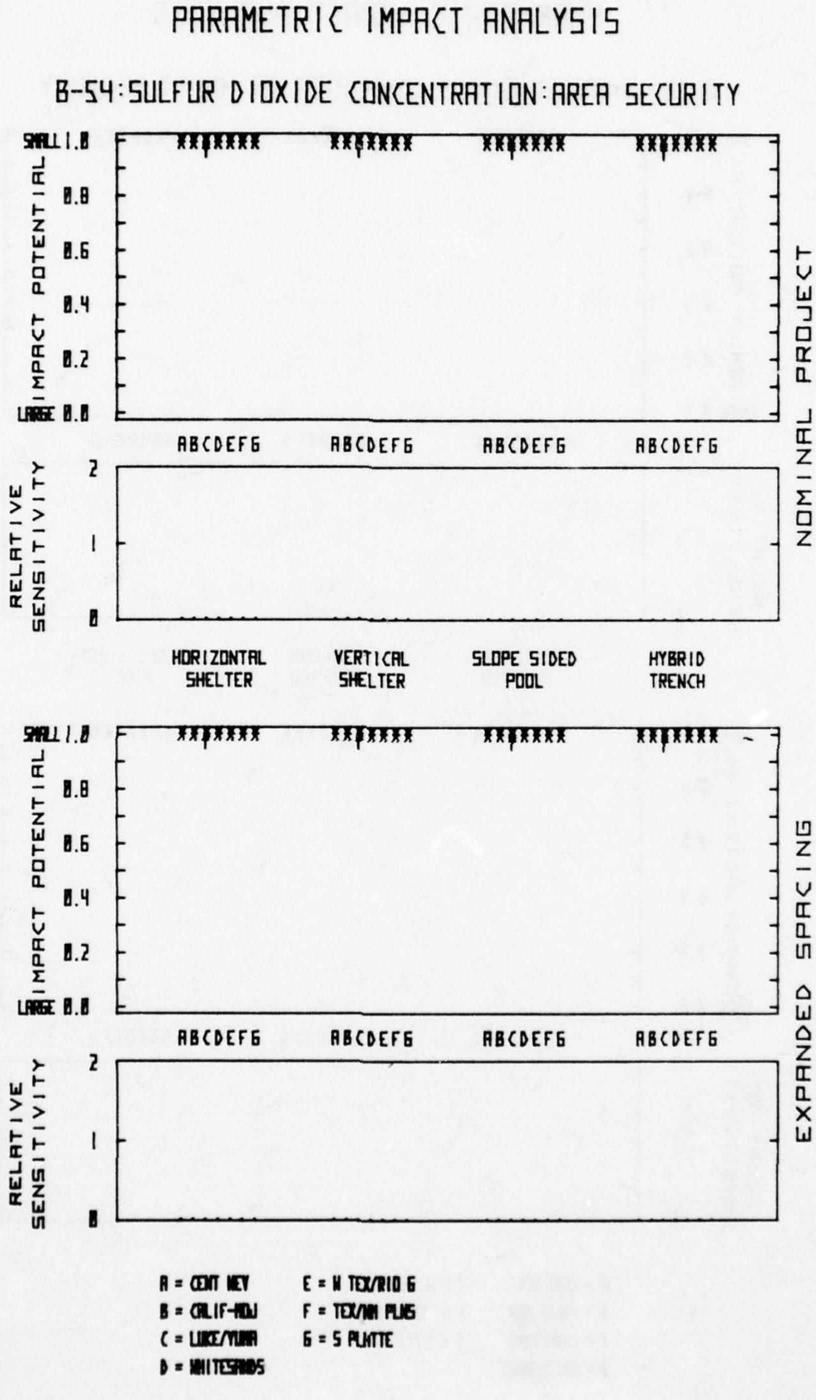

PARAMETRIC IMPACT ANALYSIS
B-54:SULFUR DIOXIDE CONCENTRATION:AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NDJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-237

PARAMETRIC IMPACT ANALYSIS

B-54: SULFUR DIOXIDE CONCENTRATION: POINT SECURITY

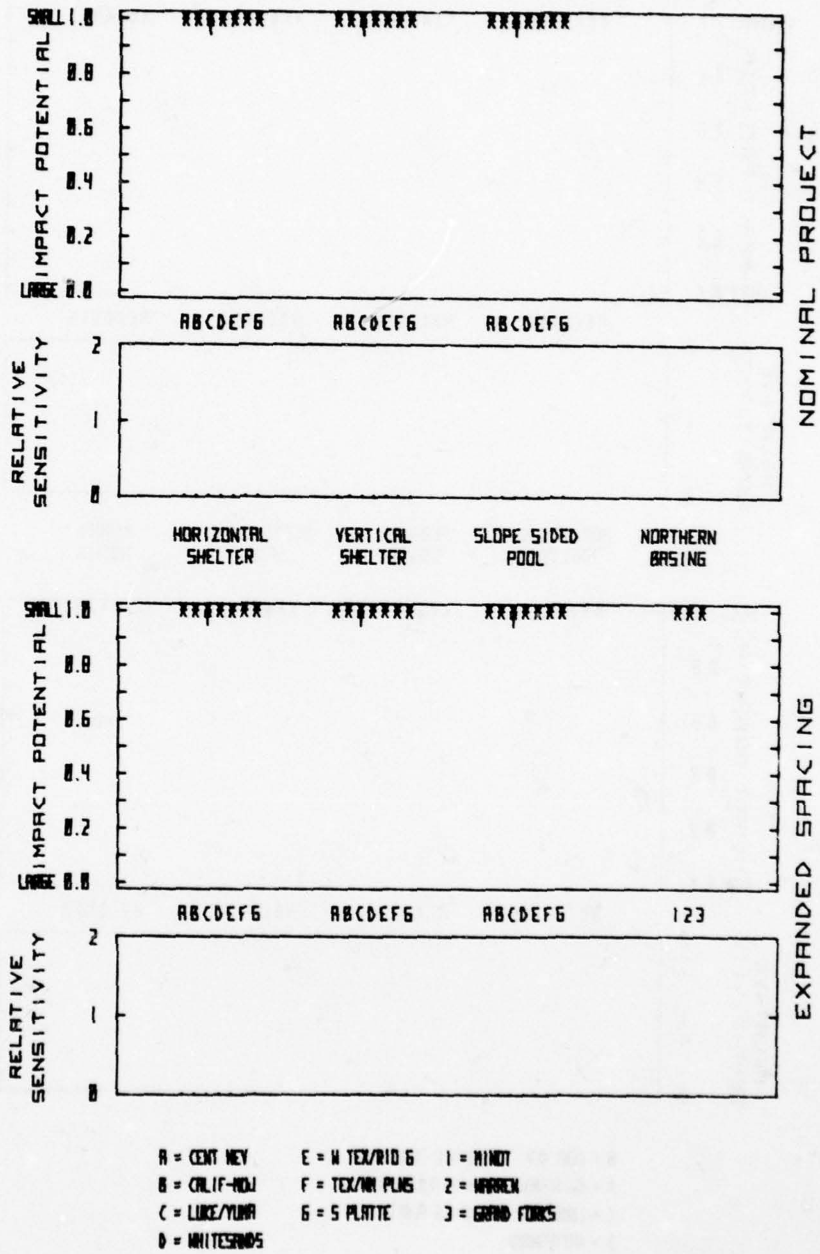


Figure B-238

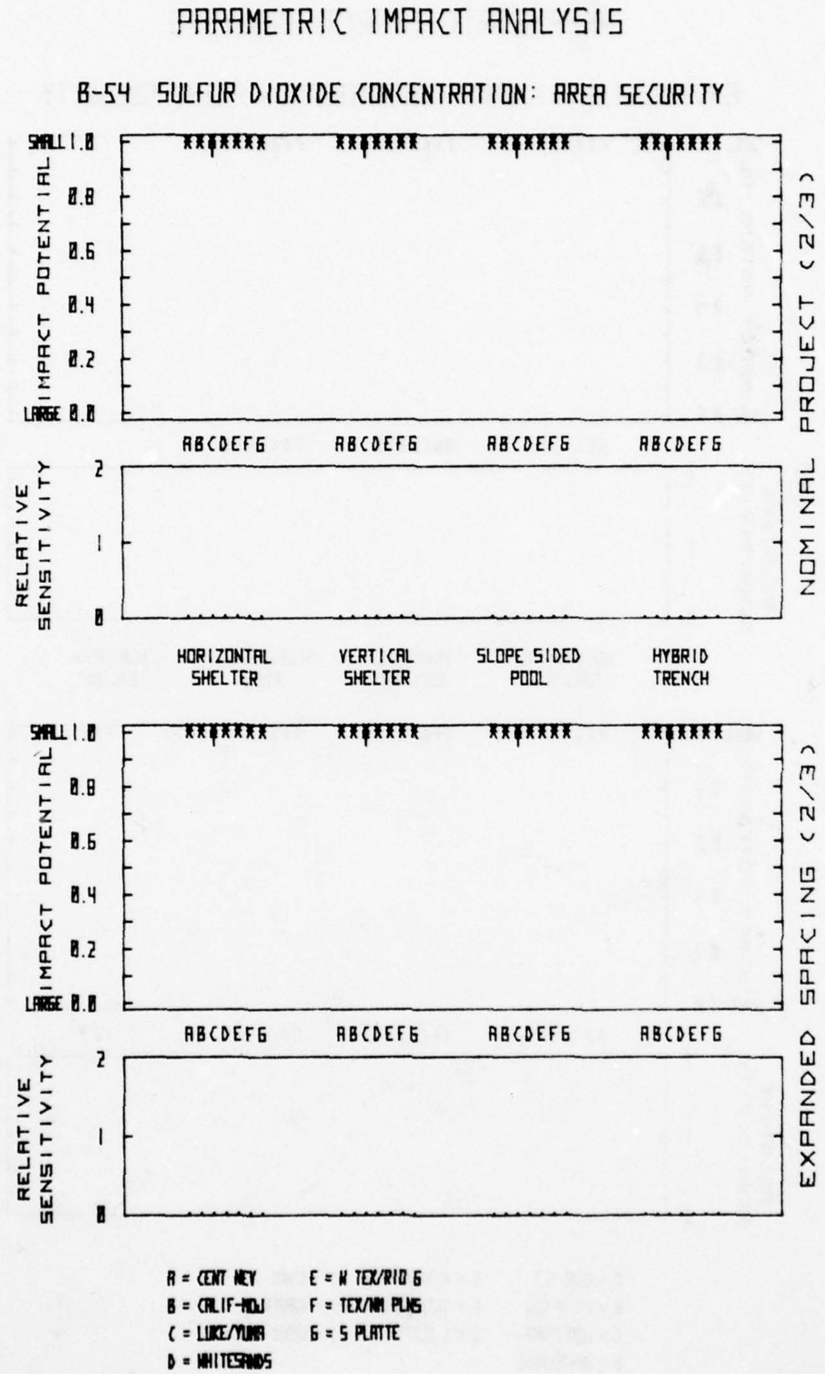

PARAMETRIC IMPACT ANALYSIS
B-54 SULFUR DIOXIDE CONCENTRATION: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG ABCDEFG ABCDEFG ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT (2/3)
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG ABCDEFG ABCDEFG ABCDEFG
RELATIVE SENSITIVITY
2
1
0
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-239

PARAMETRIC IMPACT ANALYSIS

B-54 SULFUR DIOXIDE CONCENTRATION: POINT SECURITY

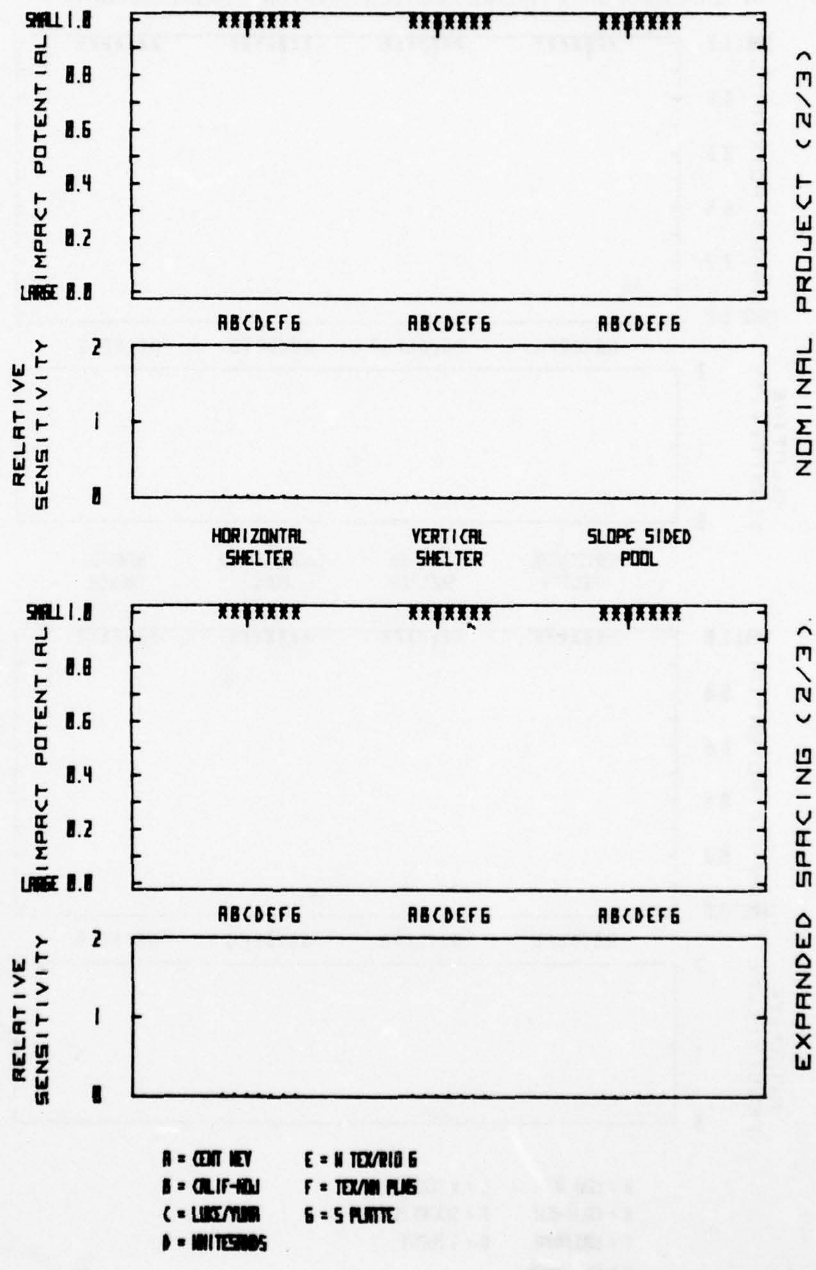


Figure B-240

PARAMETRIC IMPACT ANALYSIS

B-54 SULFUR DIOXIDE CONCENTRATION: AREA SECURITY

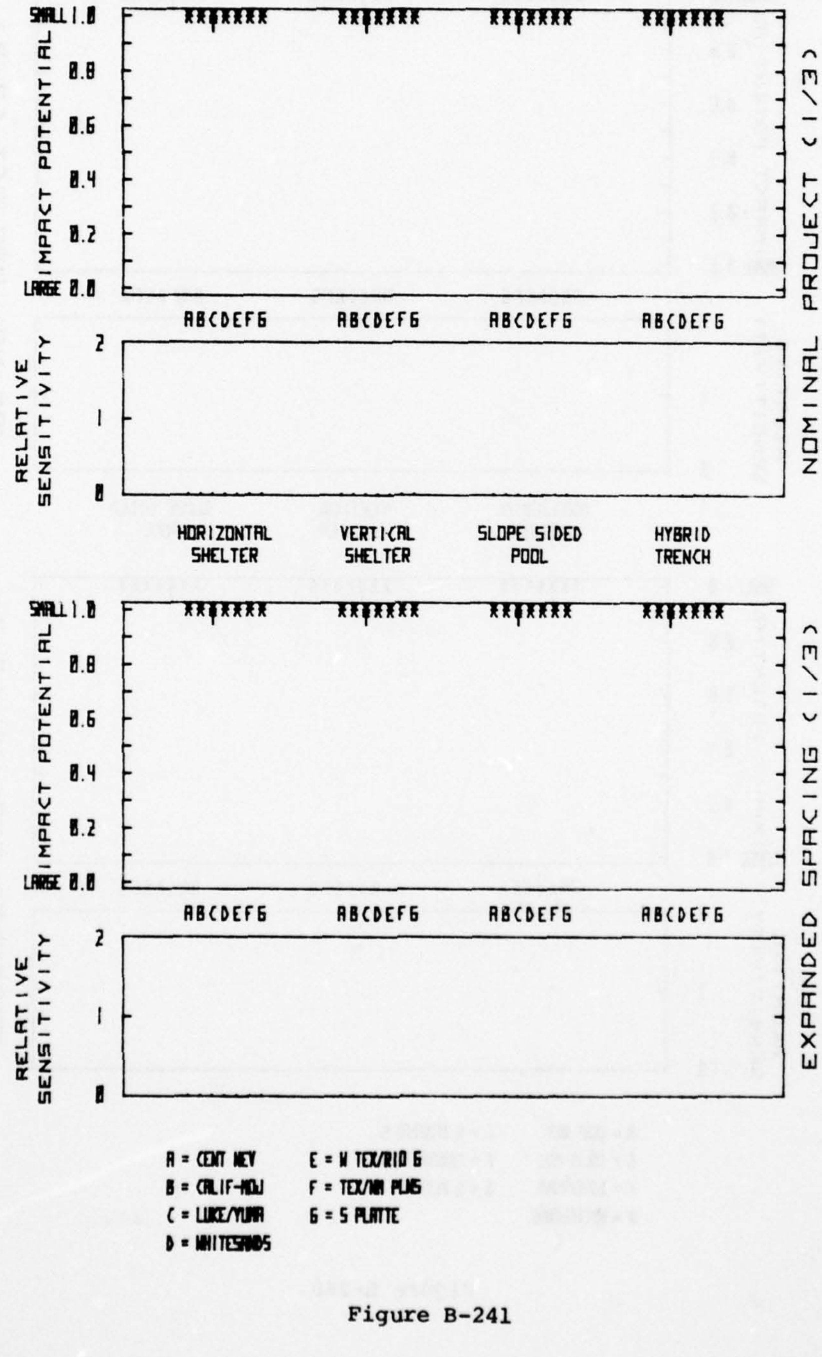


Figure B-241

PARAMETRIC IMPACT ANALYSIS

B-54 SULFUR DIOXIDE CONCENTRATION: POINT SECURITY

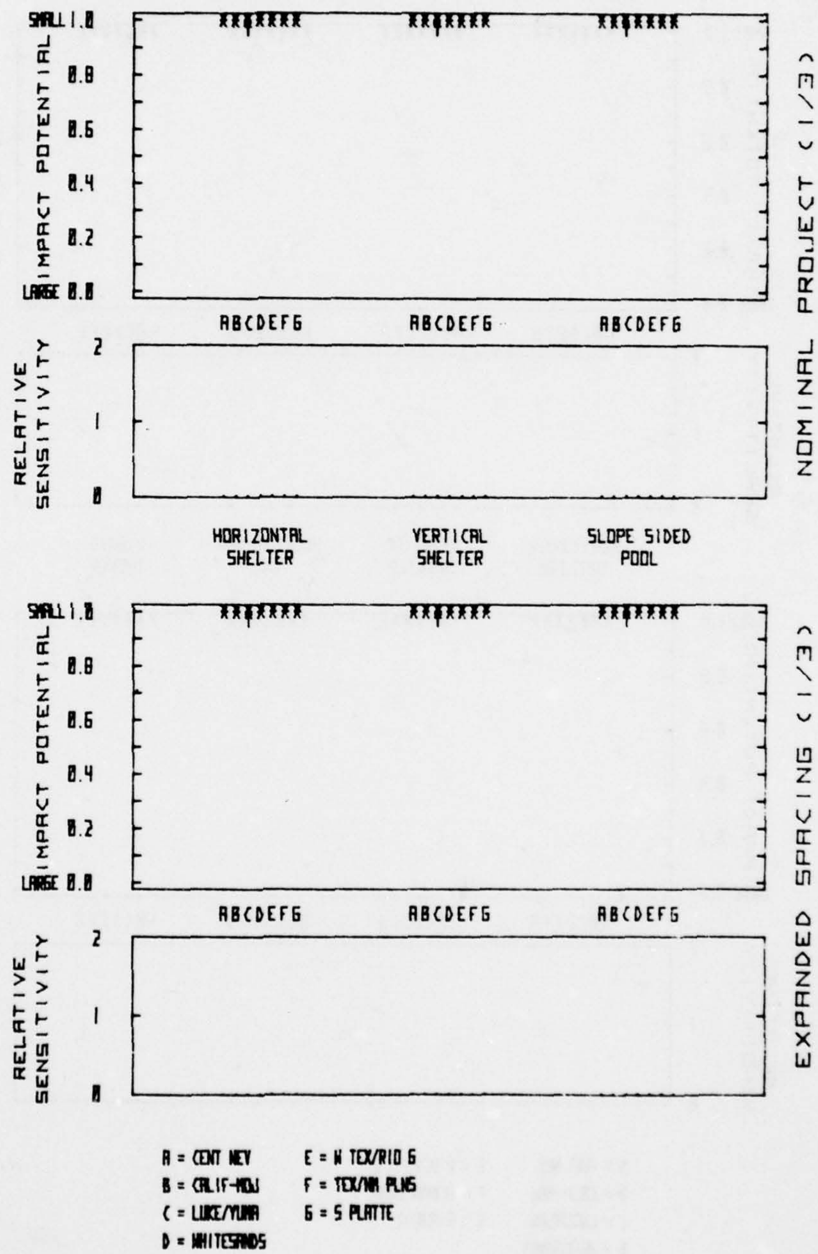


Figure B-242

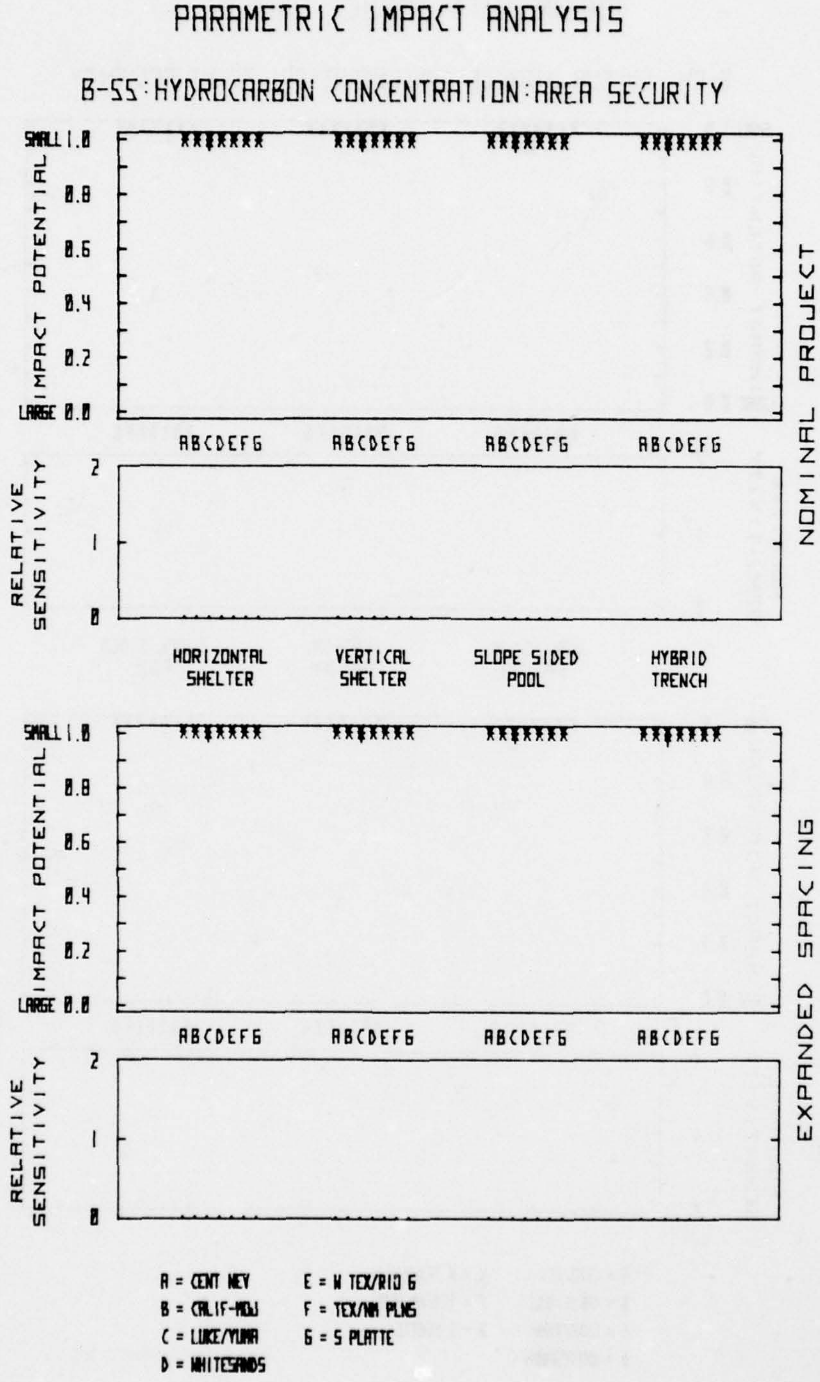

PARAMETRIC IMPACT ANALYSIS
B-55: HYDROCARBON CONCENTRATION: AREA SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-MOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-243

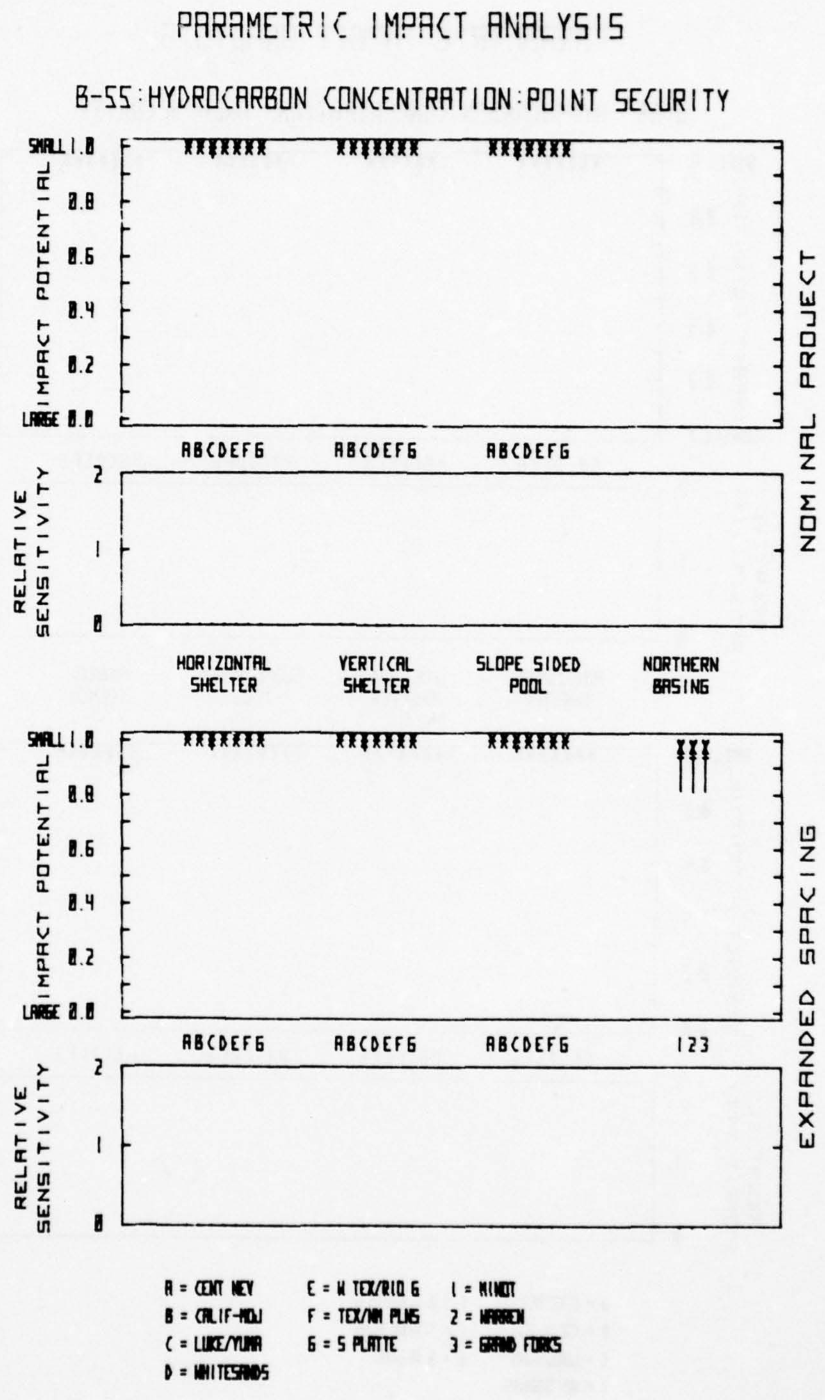
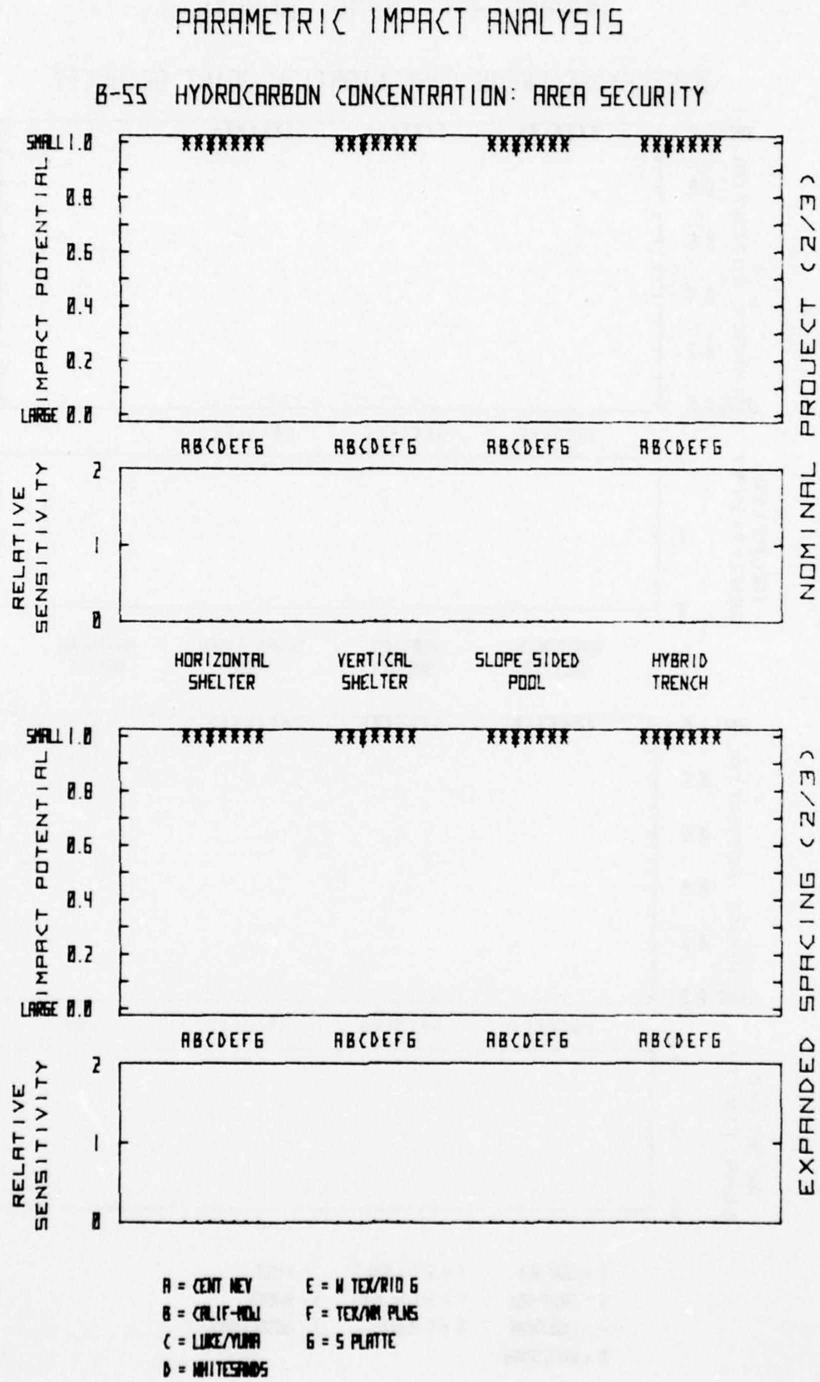

PARAMETRIC IMPACT ANALYSIS
B-55:HYDROCARBON CONCENTRATION:POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOJ
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-244



PARAMETRIC IMPACT ANALYSIS
B-55 HYDROCARBON CONCENTRATION: AREA SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
HYBRID TRENCH
NOMINAL PROJECT (2/3)
EXPANDED SPACING (2/3)
A = CENT NEV
B = CALIF-NEV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE

Figure B-245

PARAMETRIC IMPACT ANALYSIS

B-55 HYDROCARBON CONCENTRATION: POINT SECURITY

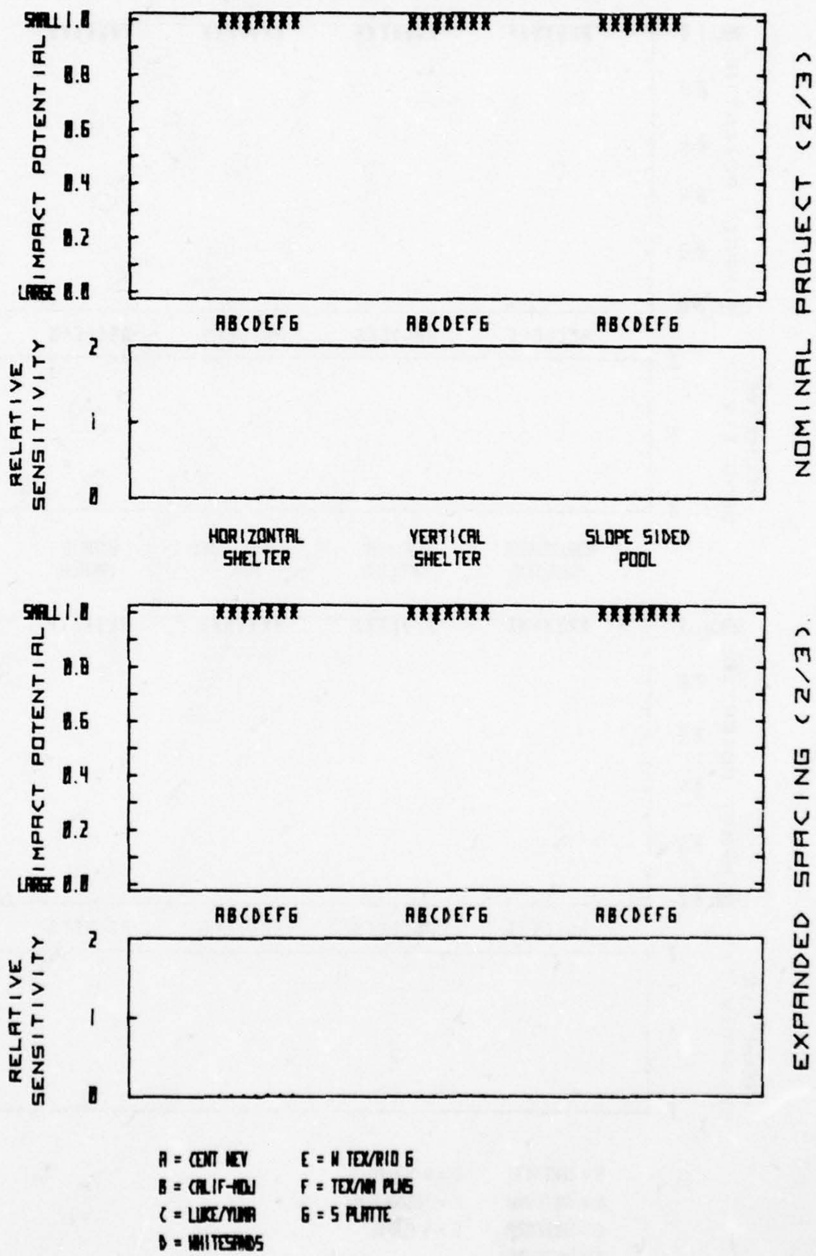


Figure B-246

PARAMETRIC IMPACT ANALYSIS

B-55 HYDROCARBON CONCENTRATION: AREA SECURITY

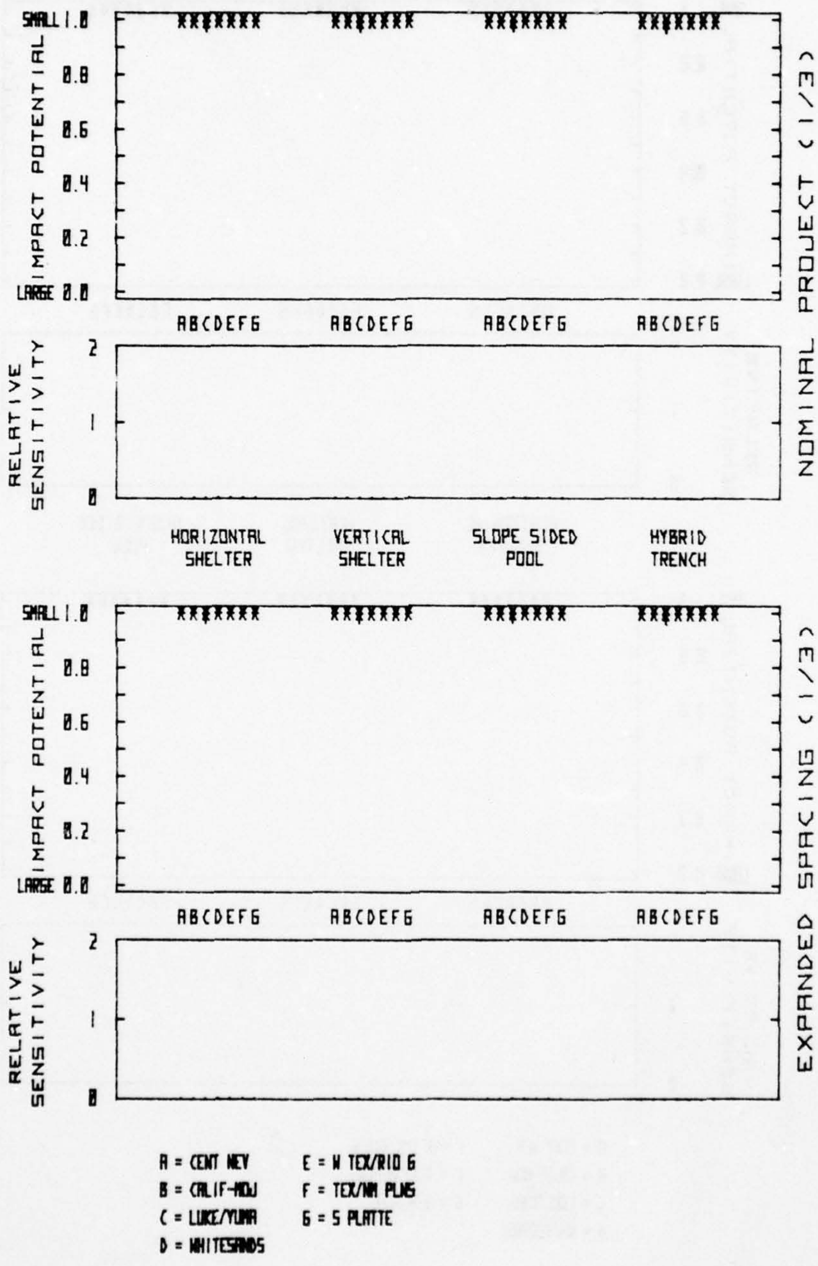


Figure B-247

PARAMETRIC IMPACT ANALYSIS

B-55 HYDROCARBON CONCENTRATION: POINT SECURITY

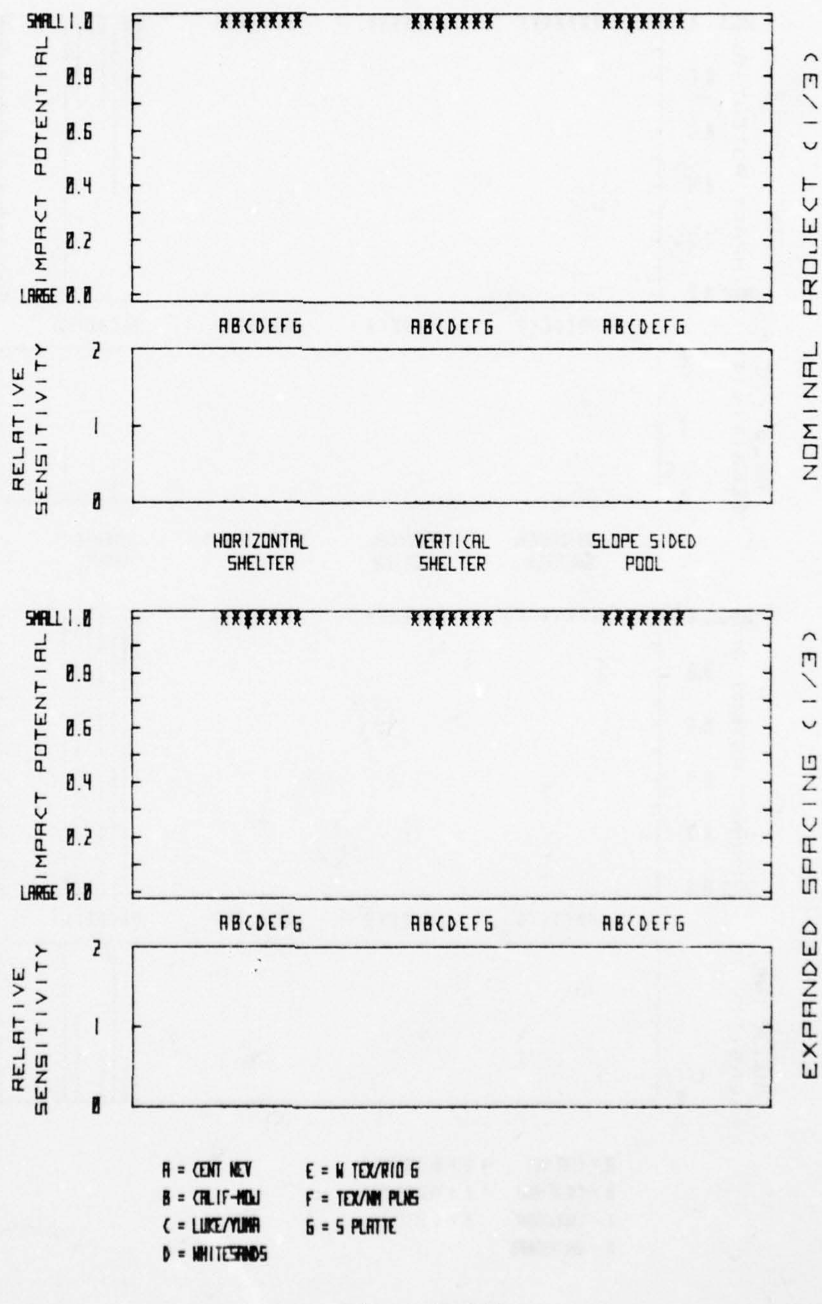


Figure B-248

PARAMETRIC IMPACT ANALYSIS

B-56: CARBON MONOXIDE CONCENTRATION: AREA SECURITY

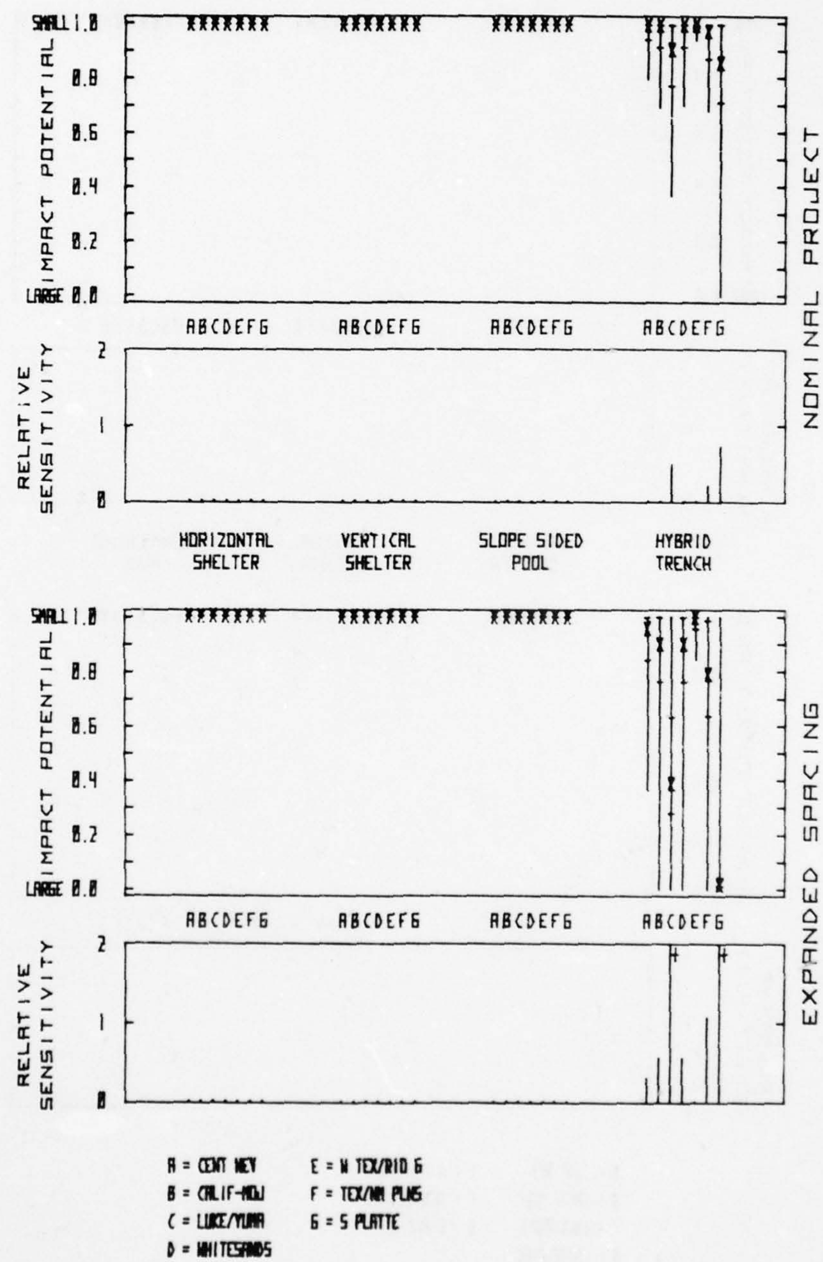


Figure B-249

AD-A063 495 AIR FORCE SYSTEMS COMMAND WASHINGTON D C F/G 5/5

MX: MILESTONE II. FINAL ENVIRONMENTAL IMPACT STATEMENT. VOLUME --ETC(U)

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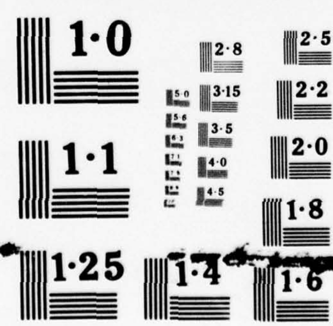
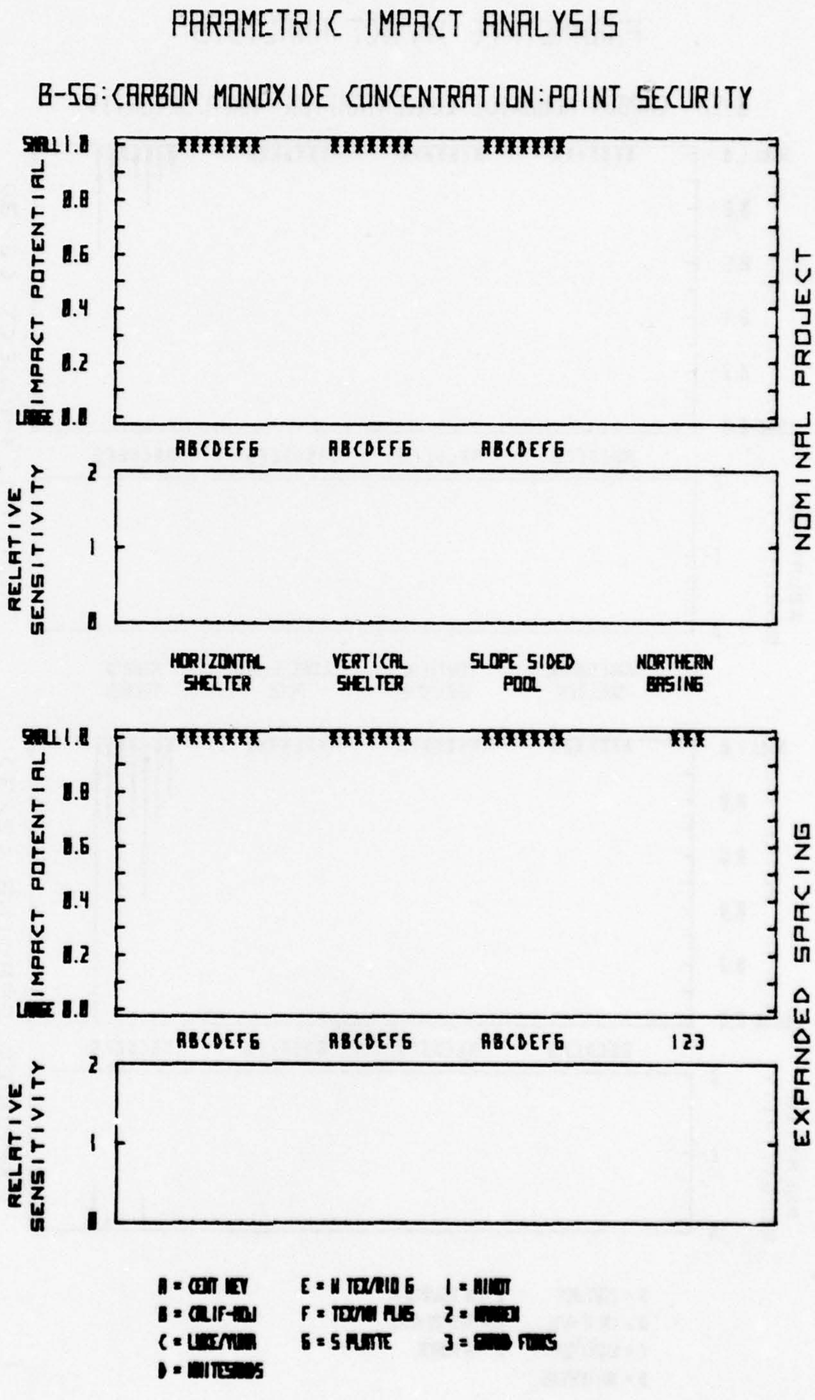




PARAMETRIC IMPACT ANALYSIS
B-56:CARBON MONOXIDE CONCENTRATION:POINT SECURITY
IMPACT POTENTIAL
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
RELATIVE SENSITIVITY
2
1
0
ABCDEFG
123
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
NOMINAL PROJECT
EXPANDED SPACING
A = CENT NEV
B = CALIF-NEV
C = LUCE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-250

PARAMETRIC IMPACT ANALYSIS

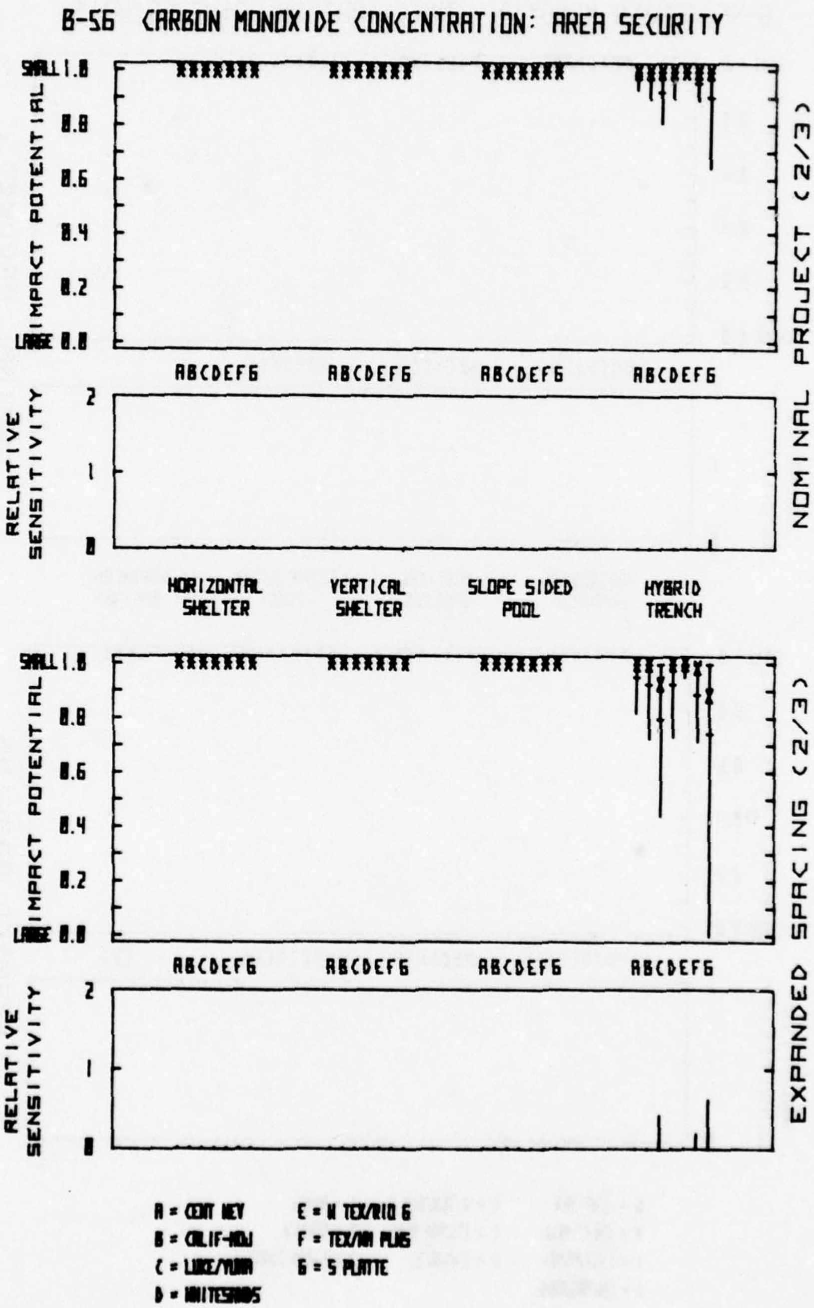


Figure B-251

PARAMETRIC IMPACT ANALYSIS

B-56 CARBON MONOXIDE CONCENTRATION: POINT SECURITY

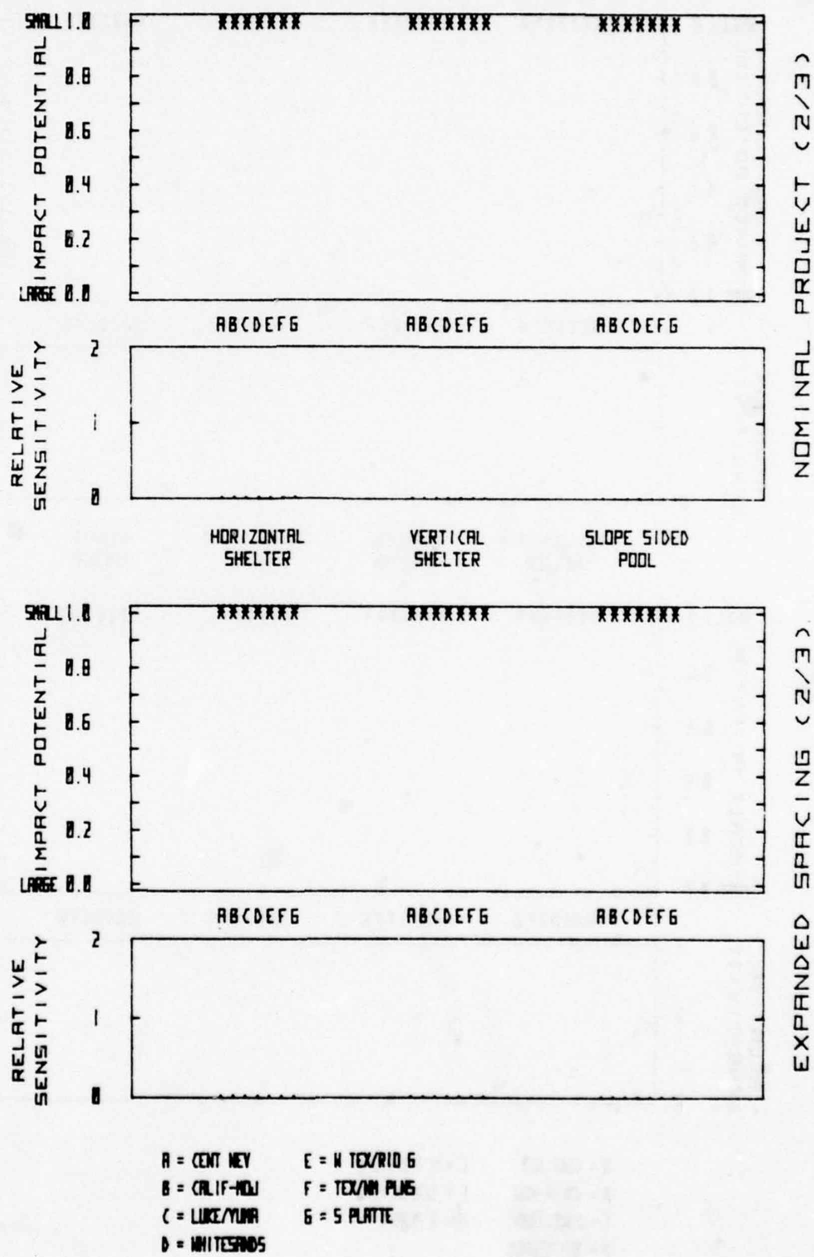


Figure B-252

PARAMETRIC IMPACT ANALYSIS

B-56 CARBON MONOXIDE CONCENTRATION: AREA SECURITY

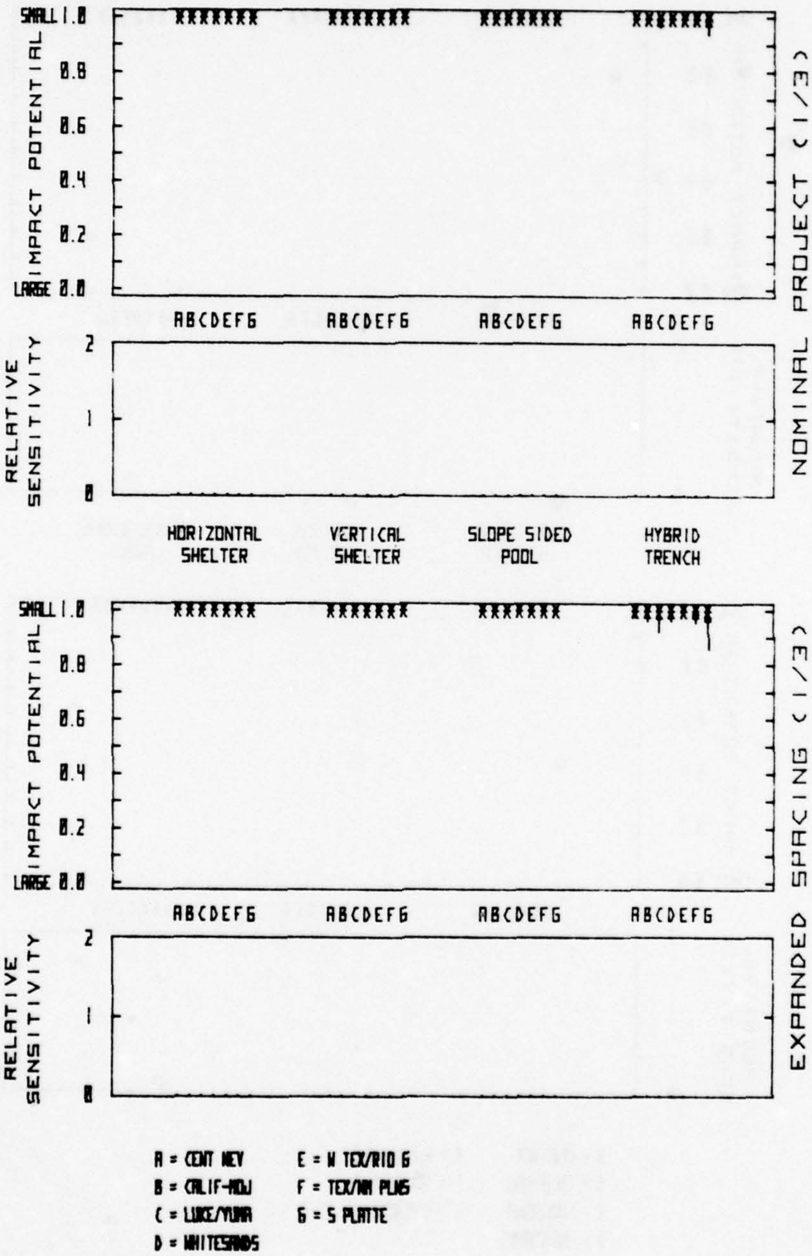


Figure B-253

PARAMETRIC IMPACT ANALYSIS

B-56 CARBON MONOXIDE CONCENTRATION: POINT SECURITY

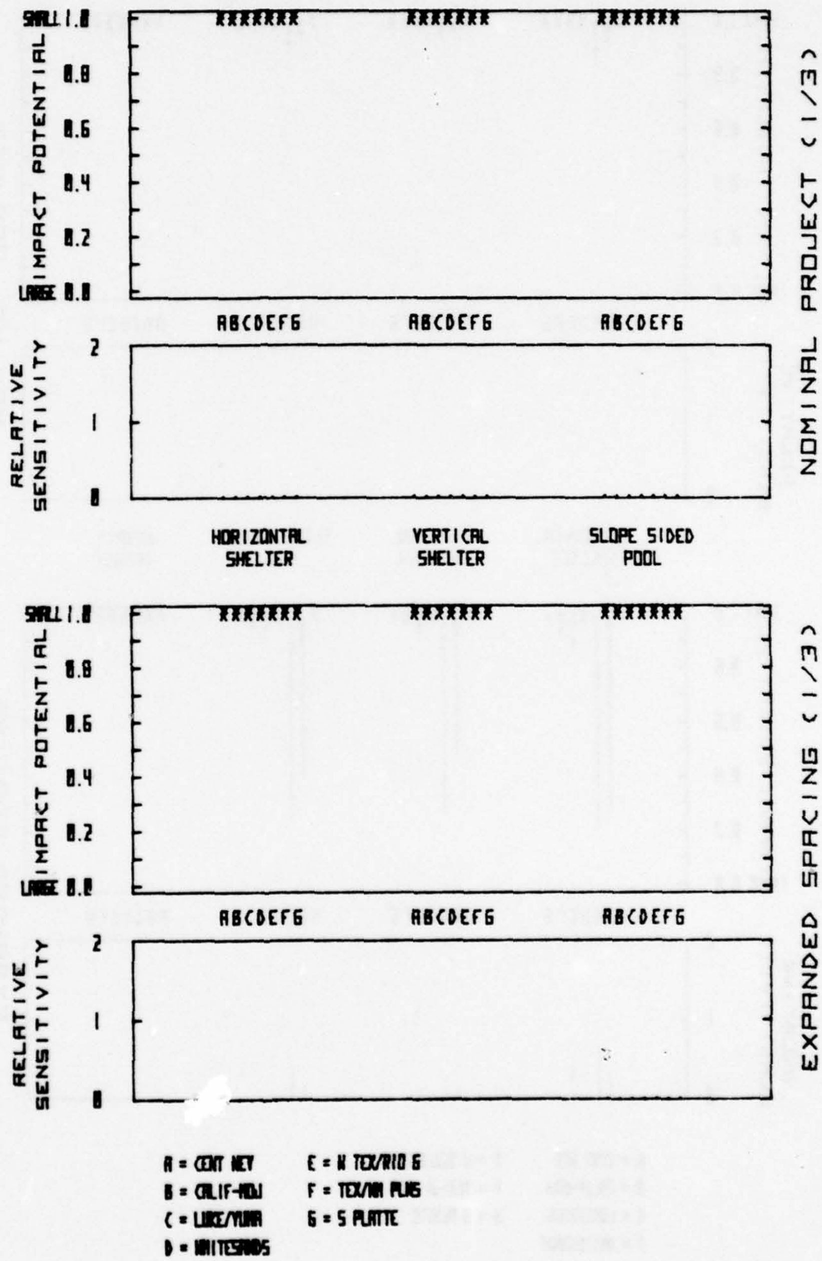


Figure B=254

PARAMETRIC IMPACT ANALYSIS

B-57: NUCLEAR ACCIDENT CONCERN: AREA SECURITY

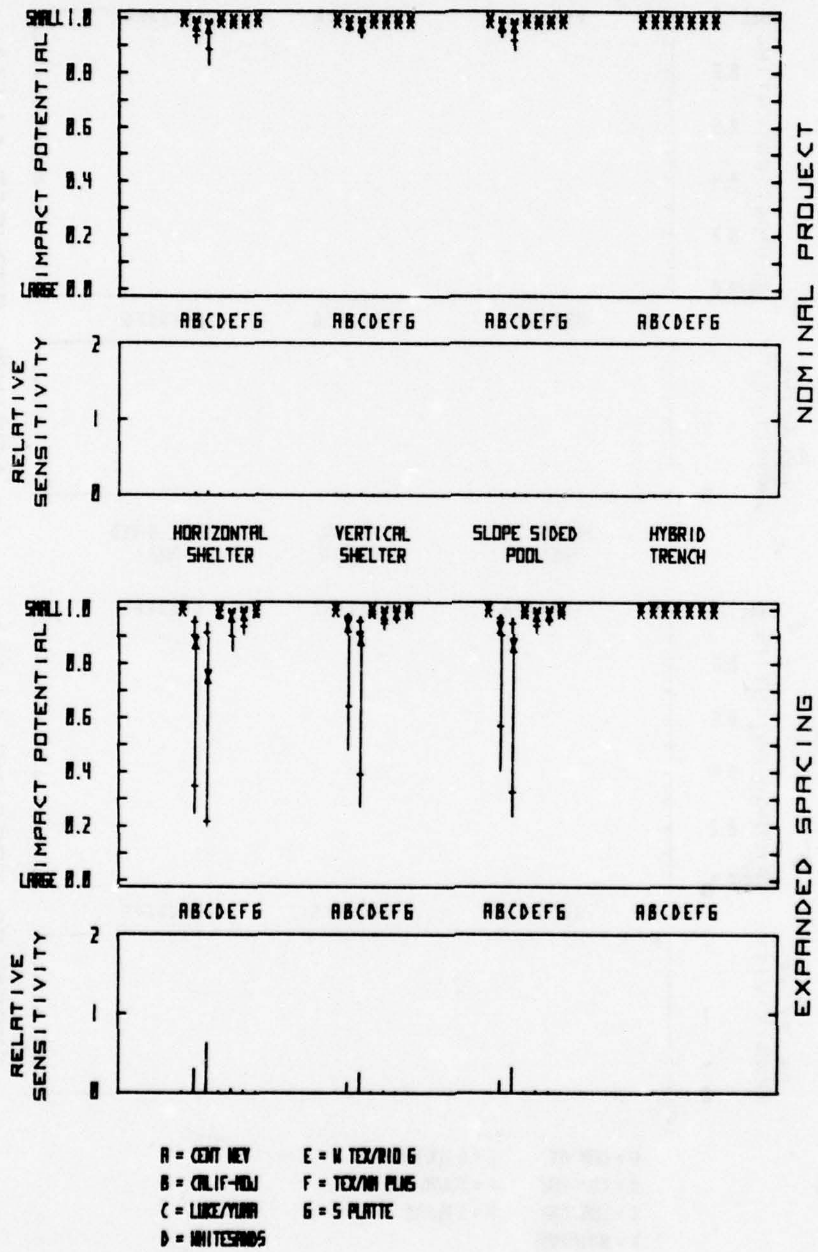
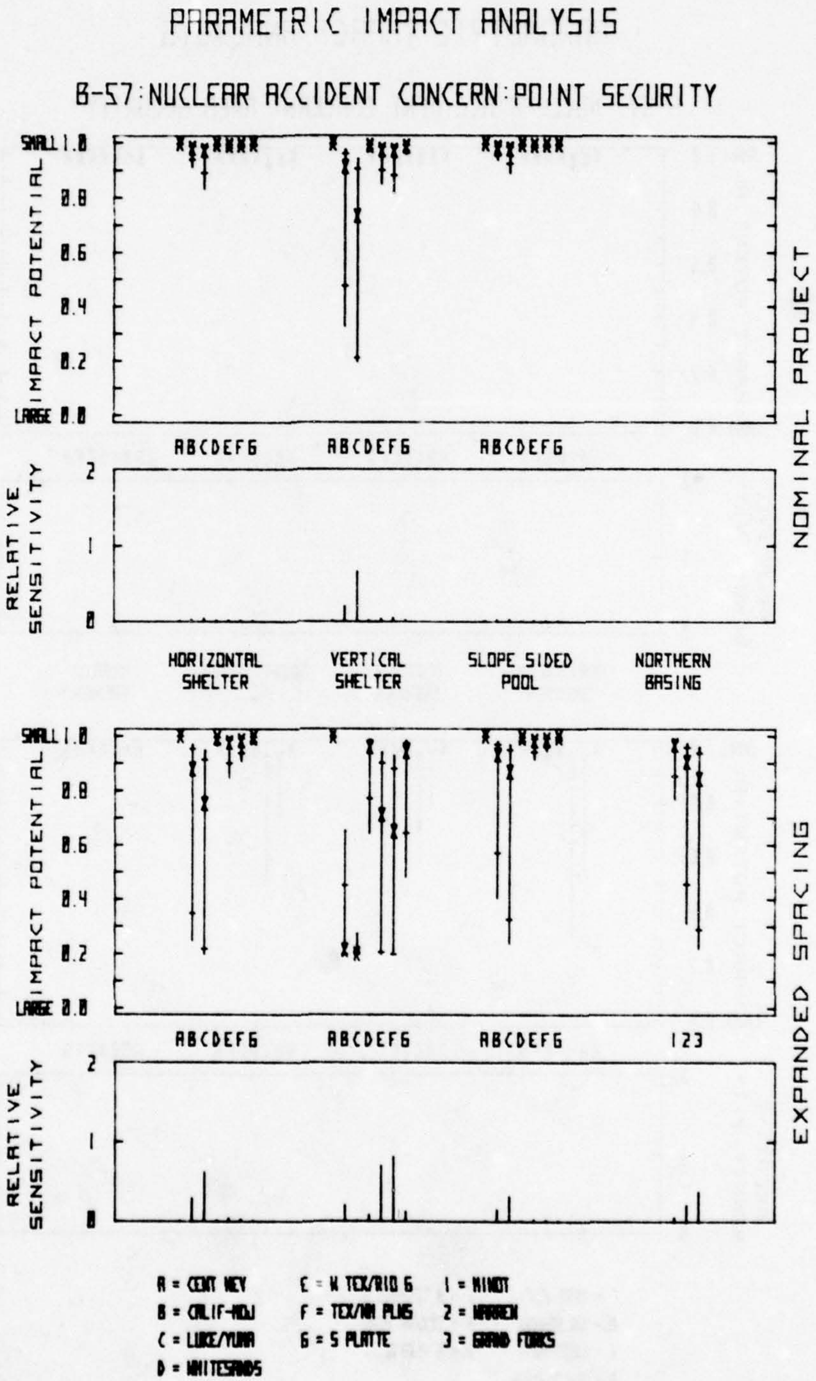


Figure B-255



PARAMETRIC IMPACT ANALYSIS
B-57: NUCLEAR ACCIDENT CONCERN: POINT SECURITY
SMALL 1.0
0.8
0.6
0.4
0.2
LARGE 0.0
IMPACT POTENTIAL
ABCDEFG
ABCDEFG
ABCDEFG
RELATIVE SENSITIVITY
2
1
0
NOMINAL PROJECT
HORIZONTAL SHELTER
VERTICAL SHELTER
SLOPE SIDED POOL
NORTHERN BASING
123
EXPANDED SPACING
A = CENT NEV
B = CALIF-NOV
C = LUKE/YUMA
D = WHITESANDS
E = W TEX/RIO G
F = TEX/NM PLNS
G = S PLATTE
1 = MINOT
2 = WARREN
3 = GRAND FORKS

Figure B-256

PARAMETRIC IMPACT ANALYSIS

B-57 NUCLEAR ACCIDENT CONCERN: AREA SECURITY

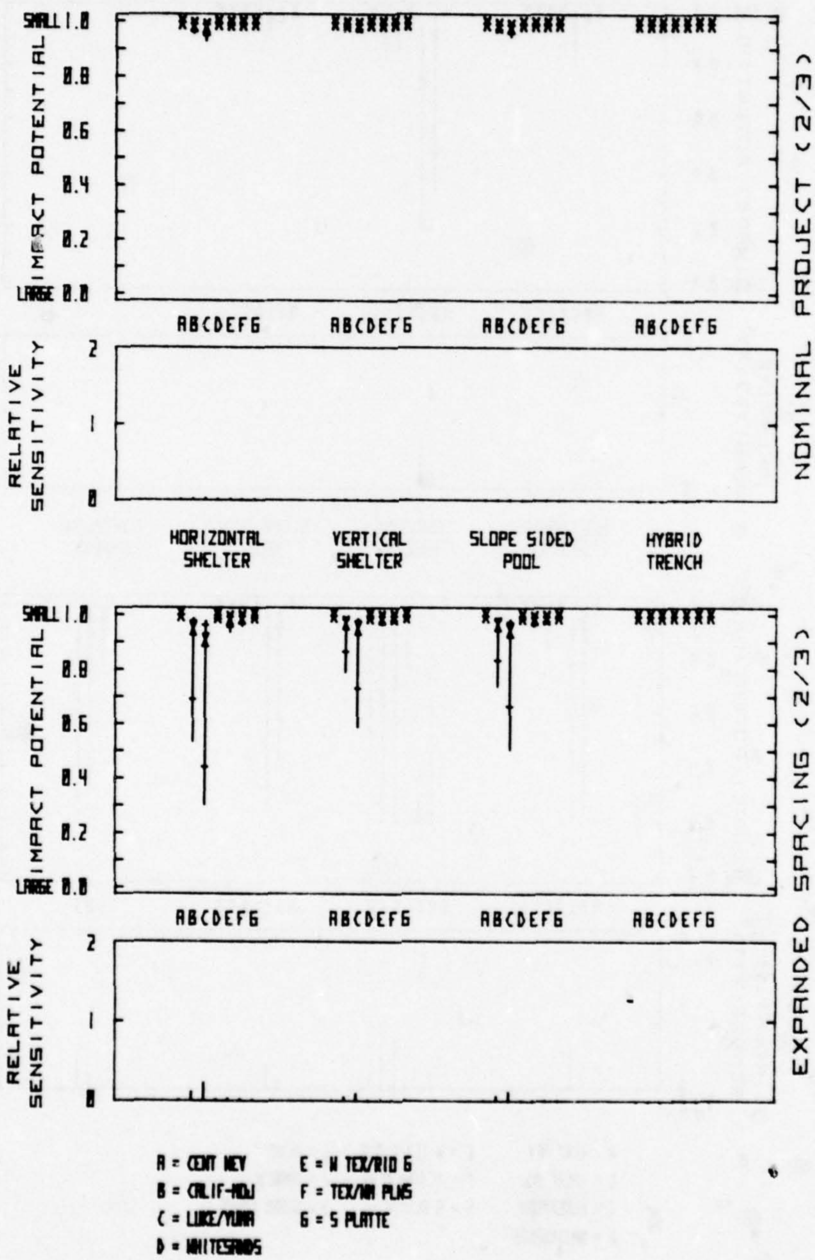


Figure B-257

PARAMETRIC IMPACT ANALYSIS

B-57 NUCLEAR ACCIDENT CONCERN: POINT SECURITY

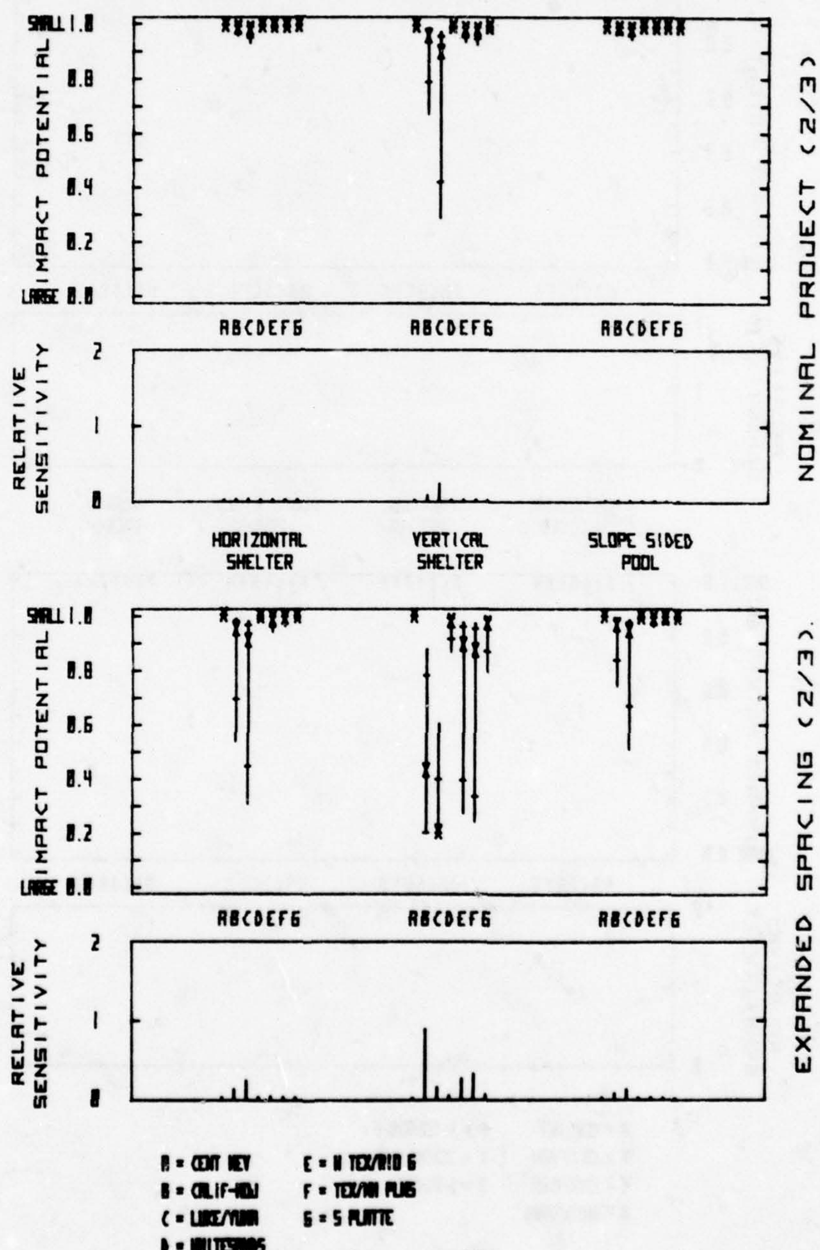


Figure B-258

PARAMETRIC IMPACT ANALYSIS

B-57 NUCLEAR ACCIDENT CONCERN: AREA SECURITY

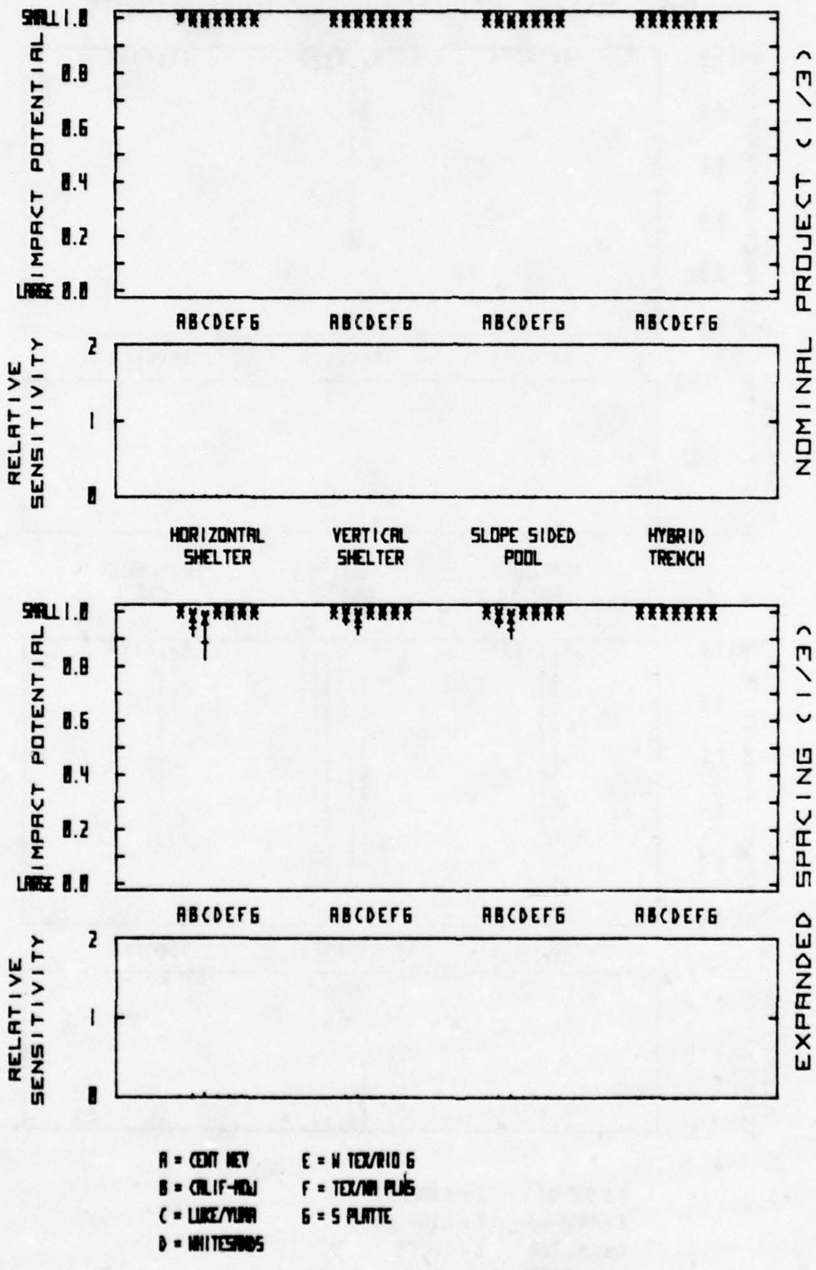


Figure B-259

PARAMETRIC IMPACT ANALYSIS

B-57 NUCLEAR ACCIDENT CONCERN: POINT SECURITY

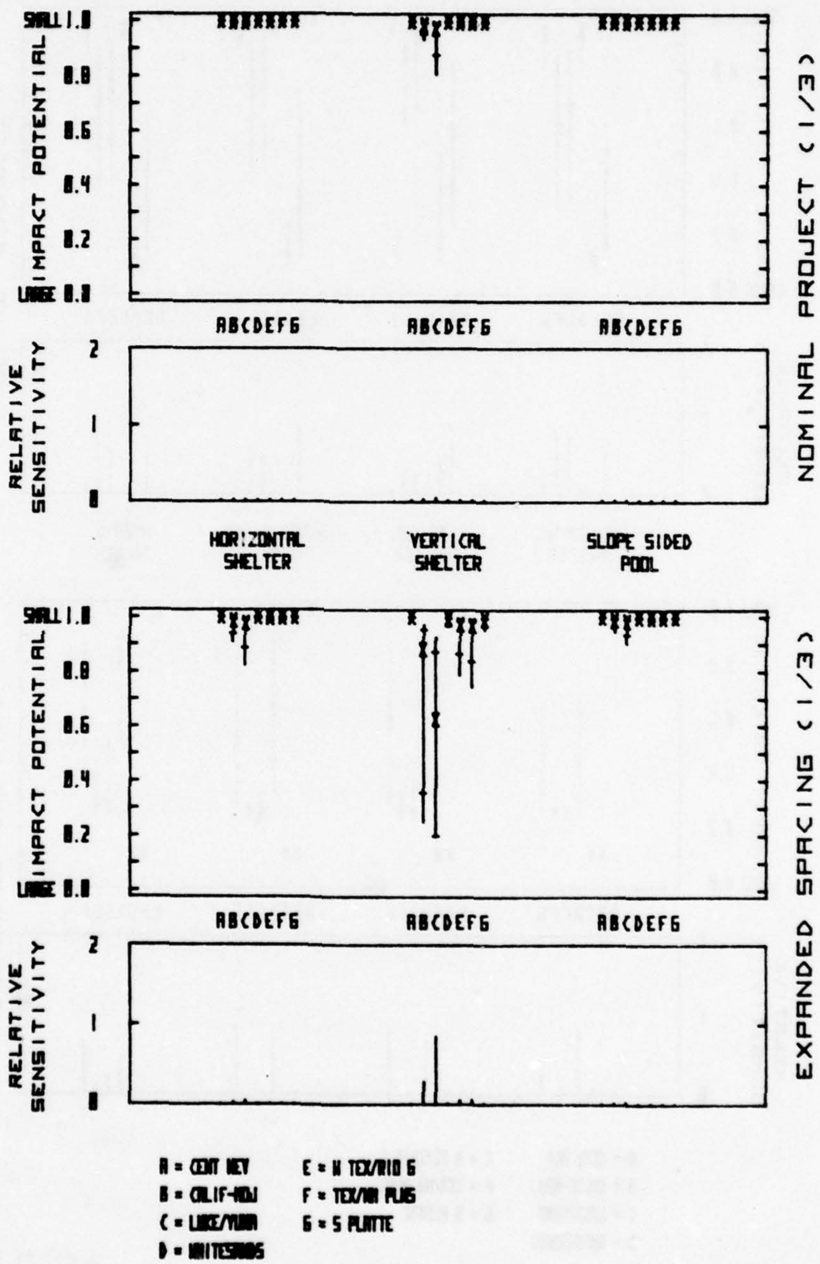


Figure B-260

PARAMETRIC IMPACT ANALYSIS

B-58:NUCLEAR TARGET CONCERN:AREA SECURITY

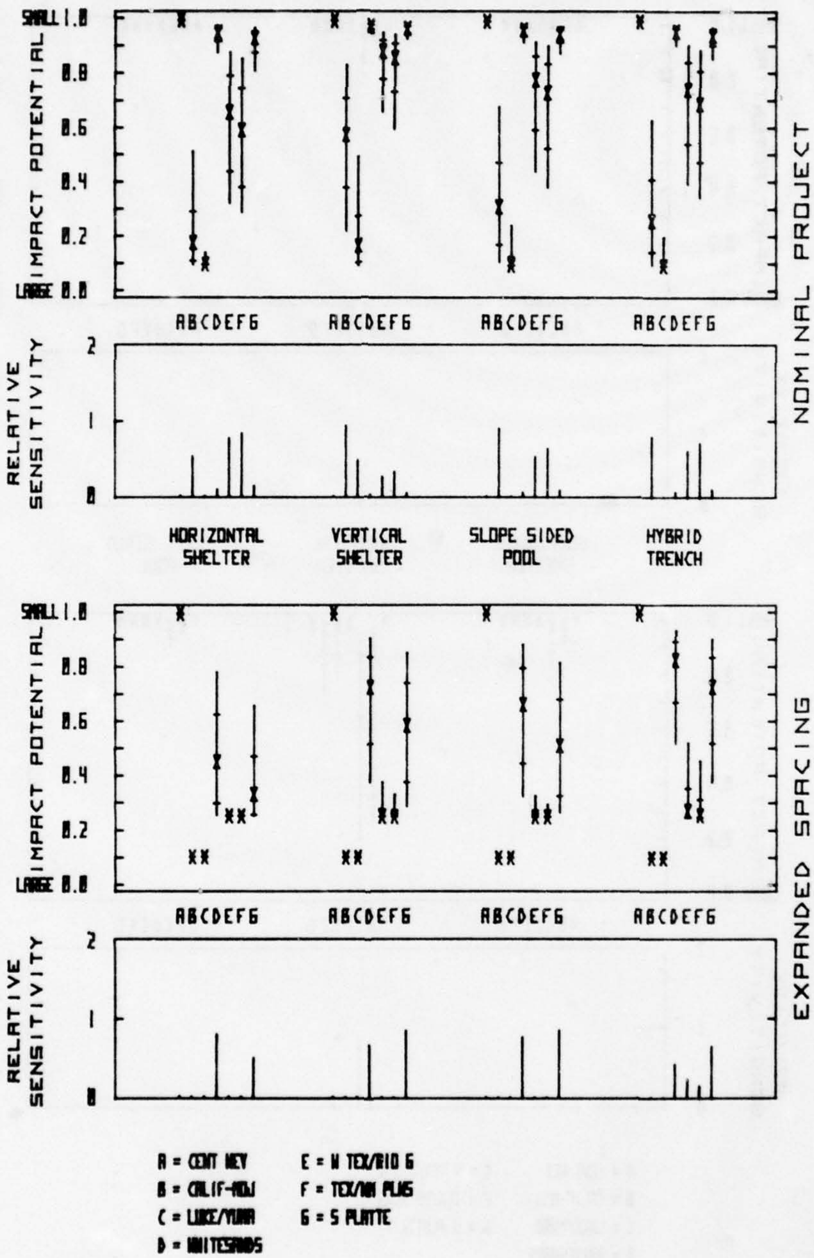


Figure B-261

PARAMETRIC IMPACT ANALYSIS

B-58: NUCLEAR TARGET CONCERN: POINT SECURITY

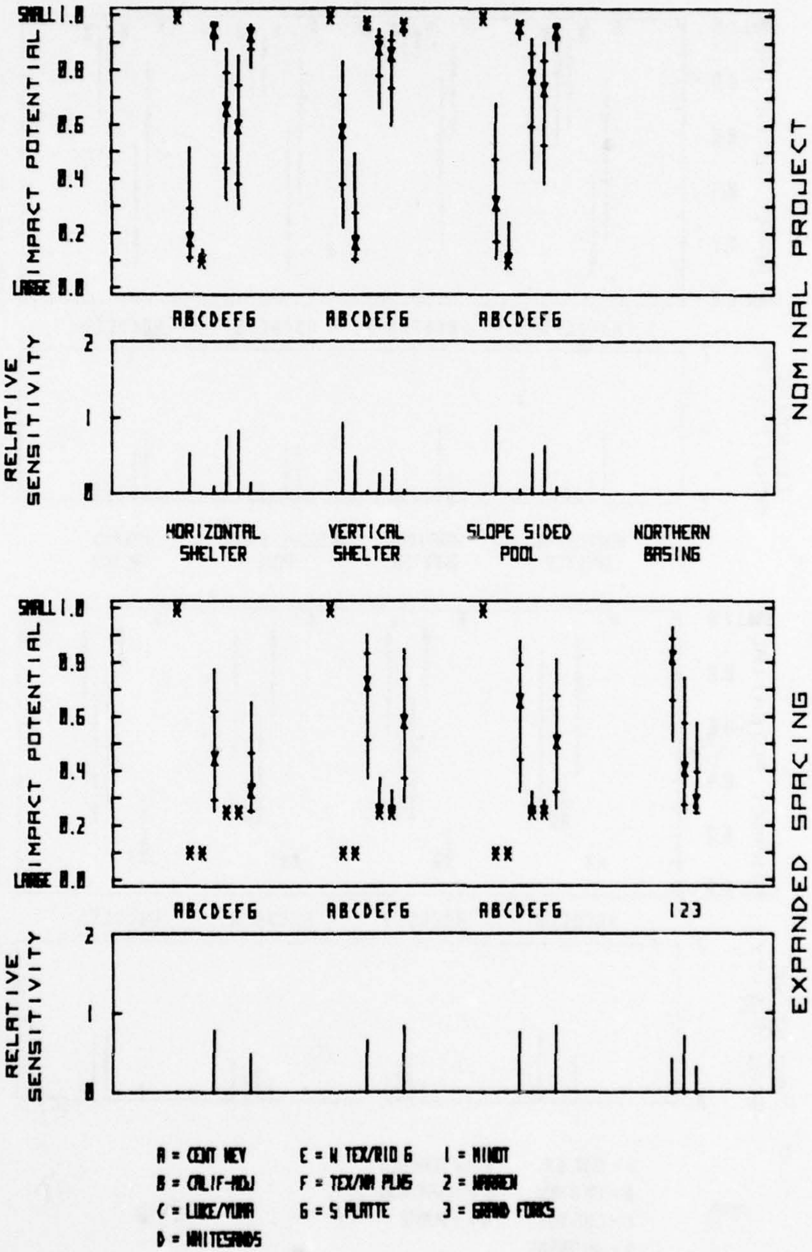


Figure B-262

PARAMETRIC IMPACT ANALYSIS

B-58 NUCLEAR TARGET CONCERN: AREA SECURITY

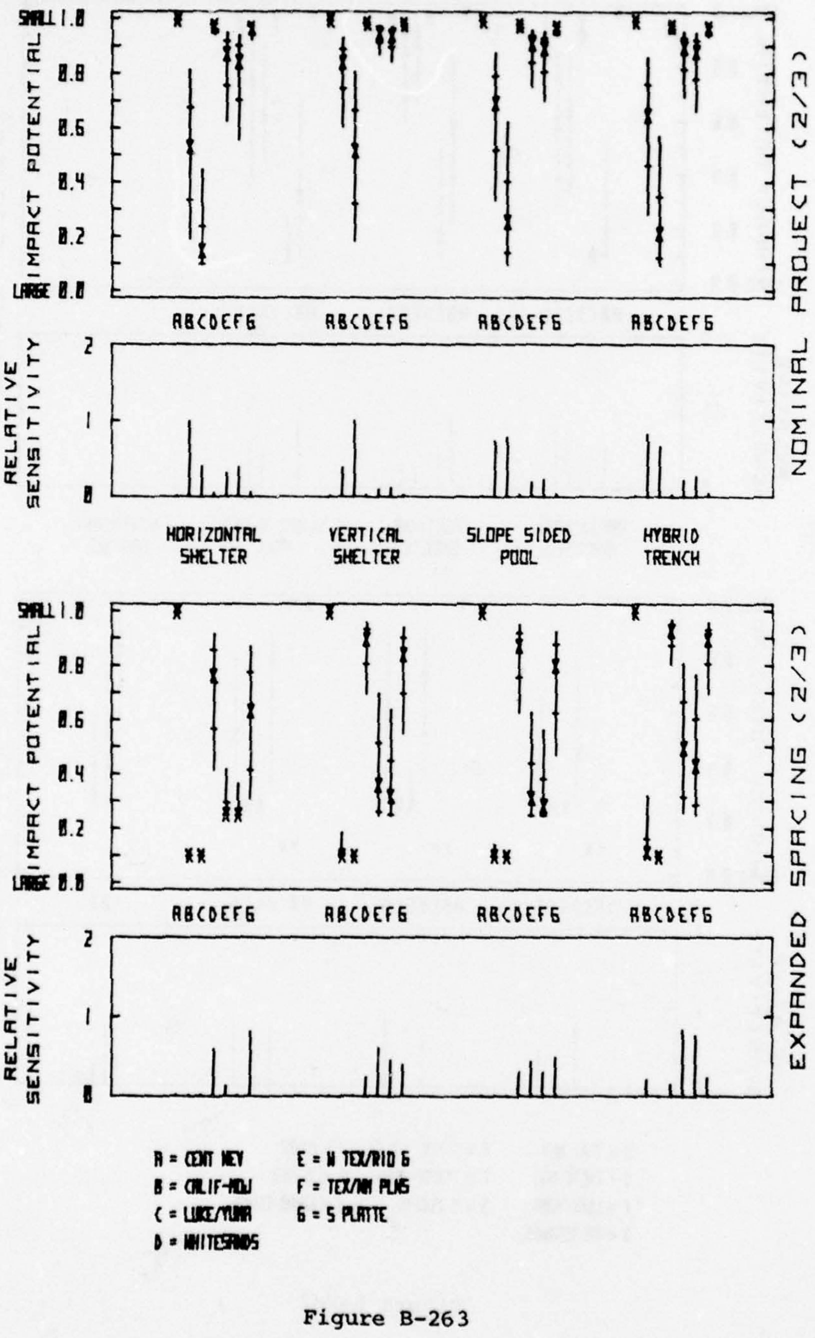


Figure B-263

PARAMETRIC IMPACT ANALYSIS

B-58 NUCLEAR TARGET CONCERN: POINT SECURITY

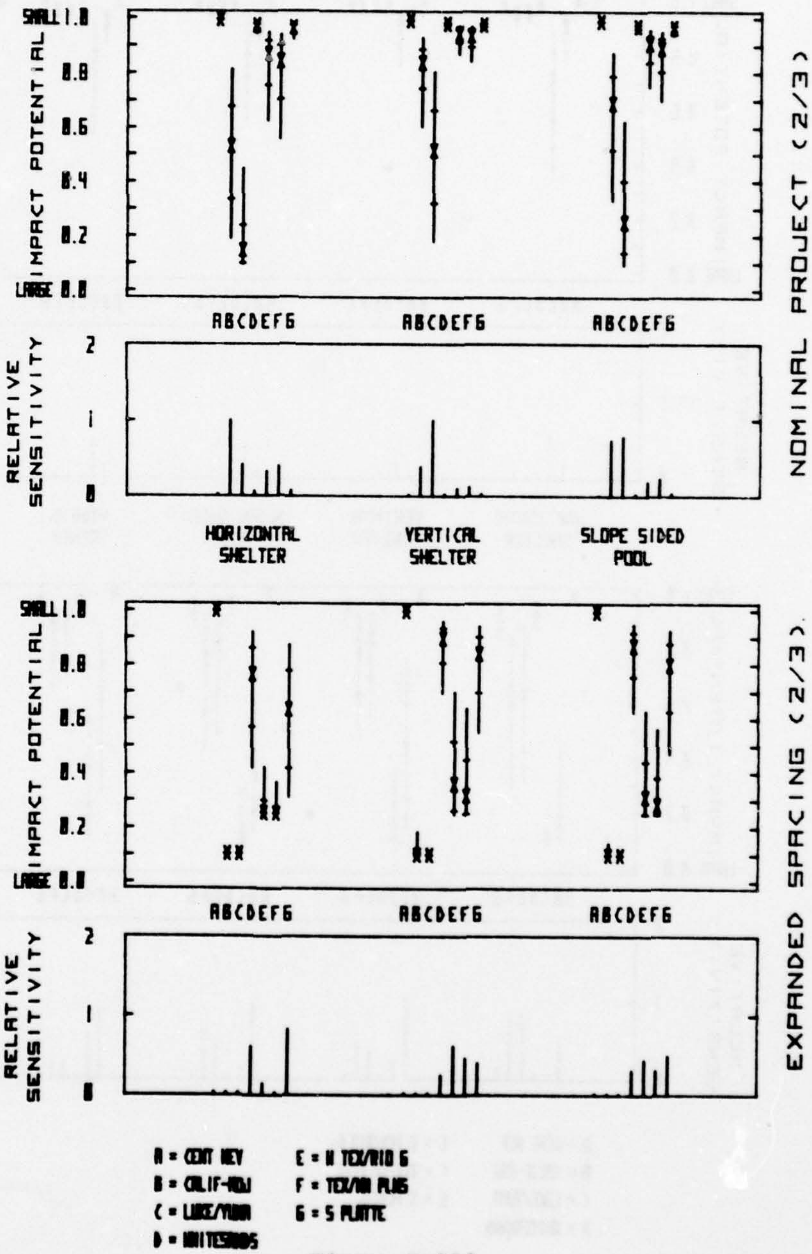


Figure B-264

PARAMETRIC IMPACT ANALYSIS

B-58 NUCLEAR TARGET CONCERN: AREA SECURITY

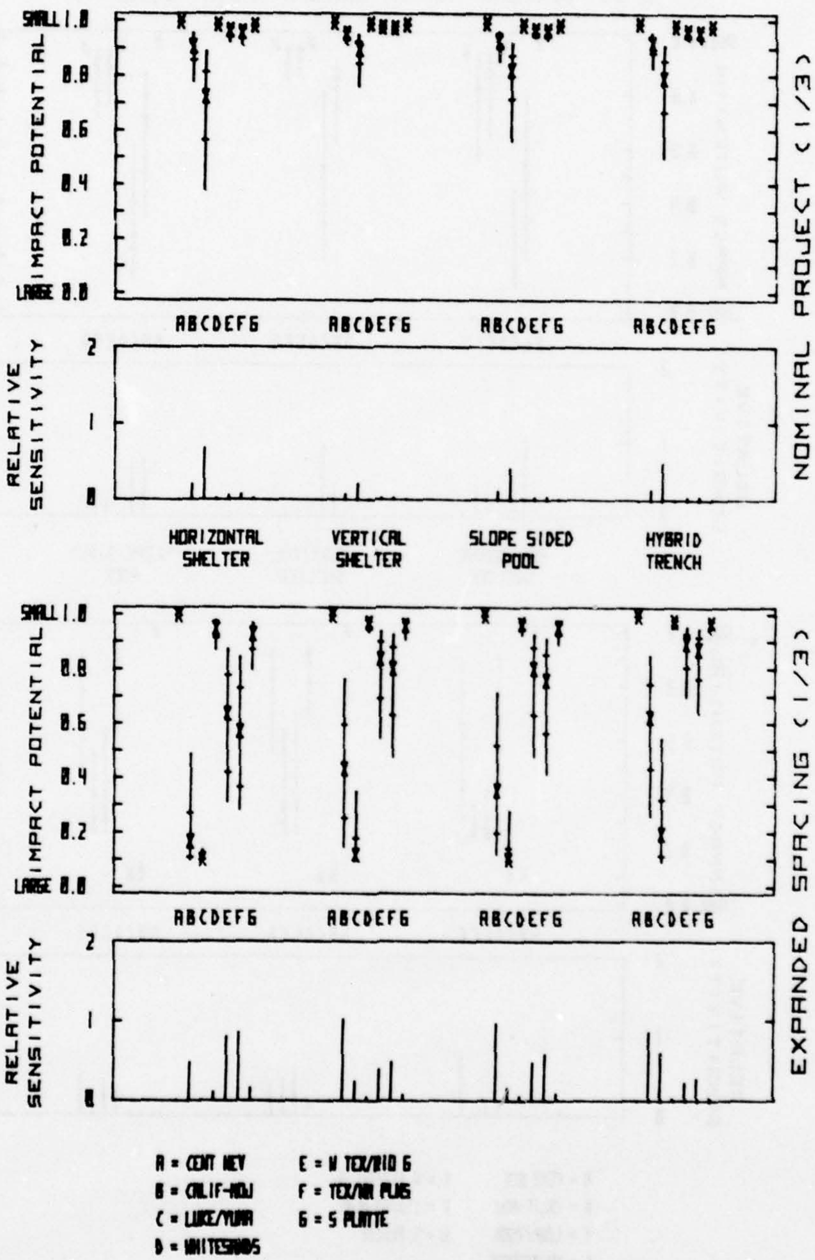


Figure B-265

PARAMETRIC IMPACT ANALYSIS

B-58 NUCLEAR TARGET CONCERN: POINT SECURITY

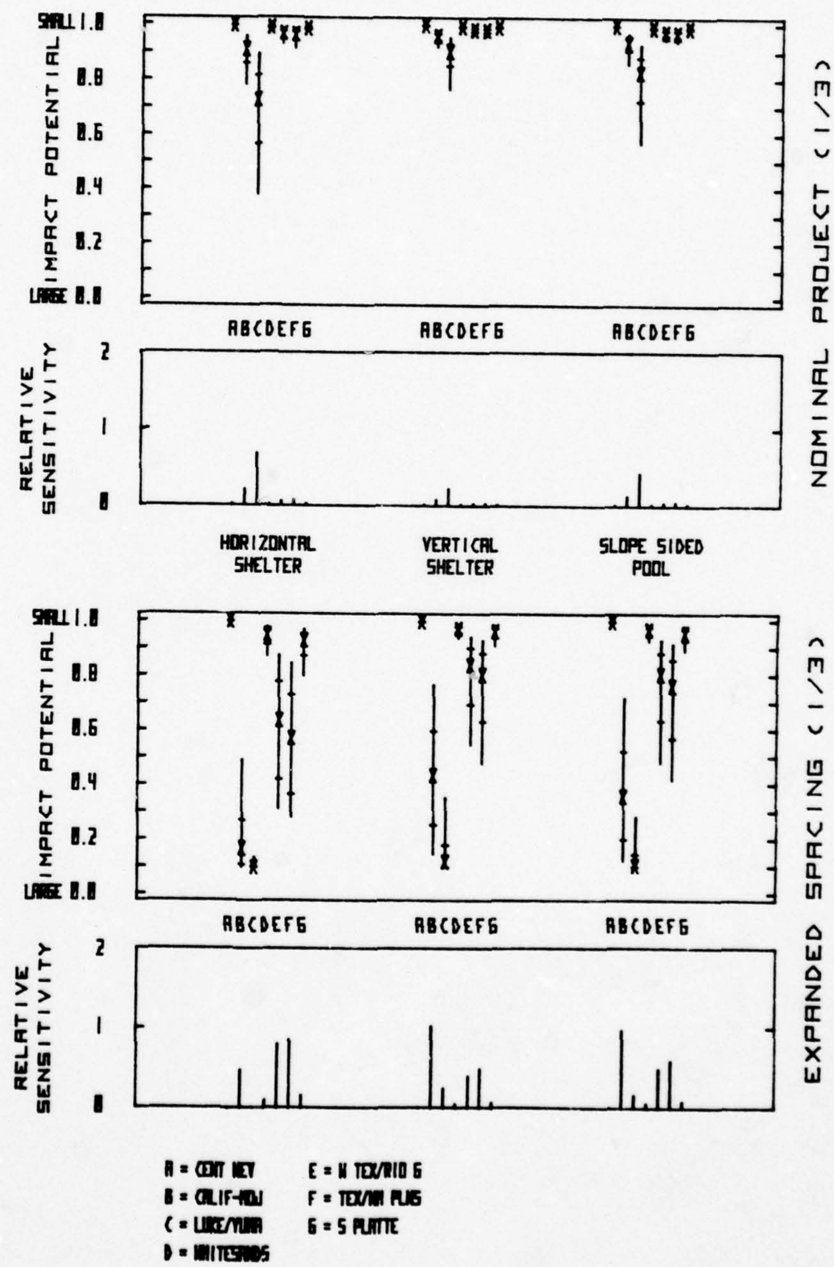


Figure B-266

C

STATUS OF SPECIAL INTEREST PLANT SPECIES AND ANALYSIS OF TERRESTRIAL WILDLIFE OCCURRING ON OR NEAR VANDENBERG MX CANDIDATE SITING AREAS

C

STATUS OF SPECIAL INTEREST PLANT SPECIES AND ANALYSIS OF TERRESTRIAL WILDLIFE OCCURRING ON OR NEAR VANDENBERG MX CANDIDATE SITING AREAS

SPECIAL INTEREST PLANT SPECIES

Currently no plant species in the vicinity of the Vandenberg Candidate Siting Areas for MX is protected by either Federal or State Endangered or Threatened Species legislation. Species which are not included on either the Federal or State Protected Species lists but have been listed in "Proposed Endangered Status for 1,700 U.S. Vascular Plant Taxa" (Federal Register, June 16, 1976) are:

La Graciosa Thistle *Cirsium loncholepis* Petrak (Asteraceae)	Endangered
Surf Thistle *C. rhothophilum* Blake (Asteraceae)	Endangered
Ida Mae's daisy *Erigeron blochmaniae* Greene (Asteraceae) = *E. foliosus* var. *blochmaniae*	Endangered
Lompoc Yerba Santa *Eriodictyon capitatum* Eastw. (Hydrophyllaceae)	Endangered

The following three species occurring in or near the candidate siting areas on Vandenberg were listed as Threatened Species in "Review of Status of Over 3,000 Vascular Plants..." (Federal Register, July 1, 1975):

Crisp Monardella (Dune Mint) *Monardella crispa* Elmer (Lamiaceae)	Threatened
Soft-leaved Indian Paintbrush *Castilleja mollis* Pennell (Scrophulariaceae)	Threatened
Black-flowered figwort *Scrophularia atrata* Pennell (Scrophulariaceae)	Threatened

The ten following species have been listed as very rare or rare and endangered by the California Native Plant Society (CNPS) (Powell, 1974), but have not appeared on Federal lists. They are included here as "special interest" species as they occur on or near the Vandenberg candidate siting areas:

Surf Malacothrix — CNPS
Malacothrix succulenta Elmer (Asteraceae)
= *M. incana* (Nutt.) T. & G. var. *succulenta* (Elmer) E. Williams

Blochman's Butterweed — CNPS
Senecio blochmaniae Greene (Asteraceae)

Arguello Wallflower — CNPS
Erysimum suffrutescens (Abrams) G. Rossb.
var. *grandifolium* G. Rossb. (Brassicaceae)

Lompoc Wallflower — CNPS
E. suffrutescens var. *lompocense*

Shagbark manzanita — CNPS
Arctostaphylos rudis Jeps. & Wies. (Ericaceae)

Lompoc manzanita — CNPS
A. viridissima (Eastw.) McMinn (Ericaceae)

Green Beach Primrose — CNPS
Camissonia cheiranthifolia (Hornem, ex Spreng.) Reimann in Engl.
& Prantl. var. *nitida* (Greene) Munz (Onagraceae)

Narrow-leaved Spine Flower — CNPS
Chorizanthe angustifolia Nutt. (Polygonaceae)

Snowy Diffuse Spine Flower — CNPS
C. diffusa Benth. var. *nivea* (Curran) Hoover (Polygonaceae)

Nipomo Ceanothus — CNPS
Ceanothus impressus Trel. var. *nipomensis* McMinn (Rhamnaceae)

ANALYSIS OF THE VERTEBRATE FAUNA WITH RESPECT TO VEGETATION HABITAT TYPE

The vertebrate faunas of the five major habitat types (annual grassland, coastal sage scrub-normal phase, coastal sage scrub-stabilized dune phase, chaparral and reparian woodland) found in MX Candidate Siting Areas on Vandenberg are characterized in this section. The distribution and relative abundance of these communities in the Candidate Siting Areas are portrayed in Figures 1-38, 1-40, 1-42, and 1-44, and the relative amounts of each habitat type that would be disturbed in each Candidate Siting Area by installation of MX facilities according to the conceptual layouts are given in Section 3 of Volume III.

The vertebrate faunas of these habitat types are analyzed and compared in order to compare potential impacts upon the vertebrate faunas between Candidate Siting Areas and between conceptual facilities layouts. We specifically examine and compare the following characteristics of the vertebrate faunas to facilitate prediction and comparison of impacts of MX construction:

- taxonomic organization
- species composition (species common to all types, species restricted to a single type)
- functional organization
- species richness and diversity

These analyses and comparisons are performed in order to identify regionally or locally unique features of the vertebrate faunas associated with particular habitat types, such as especially high or especially low species diversity, occurrence of rare or sensitive species, and/or restriction of species to a single habitat type.

Table C-1 summarizes the faunas for each of the five plant communities according to major taxonomic groups. In all of the communities, there were few amphibians and reptiles. Well over 75 percent of the species present in any community were birds and mammals. In all cases, percentages of bird species were greater than those of mammals. Within the amphibia, salamander species outnumbered frogs and toads in most communities, and among the reptiles, there were more snakes than lizards or turtles. Among the mammals, rodent species were most common, and among birds, the perching or songbirds, were best represented. These general patterns are similar to those seen in many areas of western North America (Darlington, 1957).

It is significant that riparian woodland, the least extensive of the habitats under consideration, is the richest in species on Vandenberg. Many of the vertebrate species were found to be common to all of the communities under consideration at Vandenberg. These species included the western fence lizard, *(Sceloporus occidentalis)*, gopher snake *(Pituophis melanoleucus)*, western rattlesnake *(Crotalus viridis)*, turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), California quail (*Lophortyx californicus*), desert cottontail rabbit (*Sylvilagus auduboni*), deer mouse (*Peromyscus maniculatus*), California ground squirrel (*Spermophilus beecheyi*), coyote (*Canis latrans*), and mule deer (*Odocoileus hemionus*). Other common species were found in four of the five communities. For example, the marsh hawk (*Circus cyaneus*), house finch (*Carpodacus mexicanus*) and crow (*Corvus brachyrhynchos*) were missing only from the chaparral, the black-tailed jackrabbit (*Lepus californicus*) from the riparian woodland, and the brush rabbit (*Sylvilagus bachmani*) and bobcat (*Lynx rufus*) from the annual grassland. Species found in three of the five communities included the American kestrel *(Falco sparverius)* in the coastal sage, stabilized dune and

Table C-1. Numbers of species and percent of total species of vertebrates found in five plant communities on Vandenberg AFB arranged by taxonomic categories. Percentages are based on fractions of the total number of species in a community. RW = riparian woodland; CH = chaparral; CSS = coastal sage scrub; SD = stabilized dune phase of coastal sage scrub; AG = annual grassland. References for community types and species lists are Coulombe and Cooper (1976) and Coulombe and Mahrdt (1976). Bird data were presented for the combined CS and SD communities. The total number of bird species for the combined communities was added to the total of the other vertebrate species in the CS and SD communities. Only species actually observed in these habitats are included.

CATEGORY	RW	CH	CS	SD	AG
Amphibia	5 (7.2%)	3 (4.8%)	3 (5.4%)	2 (4.3%)	2 (3.6%)
Anura (frogs)	3	1	1	0	1
Caudata (salamanders)	2	2	2	2	1
Reptilia	9 (13.0%)	11 (17.7%)	11 (19.6%)	7 (14.9%)	11 (20.0%)
Sauria (lizards)	3	4	4	3	4
Serpentes (snakes)	6	7	7	4	7
Mammalia	22 (31.9%)	23 (37.1%)	22 (39.3%)	18 (38.3%)	16 (29.1%)
Marsupialia (oppossums)	1	1	0	0	1
Insectivora (shrews and moles)	2	2	3	2	2
Lagomorpha (rabbits)	2	3	3	3	2
Rodentia (rats and mice)	10	9	11	7	7
Carnivora (predators)	5	7	4	4	3
Artiodactyla (deer and pigs)	2	1	1	2	1
Aves	33 (47.8%)	25 (40.3%)	20 (36.0%)		26 (47.3%)
Falconiformes (hawks and vultures)	4	2	4		5
Charadriformes (killdeer and plovers)	1	1	1		1
Galliformes (quail)	1	0	0		0
Columbiformes (doves)	1	1	0		2
Cucaloformes (roadrunners)	0	0	0		1
Strigiformes (owls)	1	0	0		0
Caprimulgiformes (poor-will)	0	0	0		0
Apodoformes (hummingbirds)	2	1	0		0
Coraciiformes (woodpeckers)	2	1	0		0
Passeriformes (songbirds)	21	19	15		17
Total	69	62	(36)* 56	(27)* 47	55

*Total number of non-avian vertebrates.

annual grassland, scrub jay *(Aphelocoma coerulescens)* in the chaparral, coastal sage and stabilized dune, raccoon *(Procyon lotor)* in the riparian woodland, chaparral and coastal sage, and mourning dove (*Zenaidura macroura*) and striped skunk (*Mephitis mephitis*) in the riparian woodland, chaparral and annual grassland. Most of the above species can live in a variety of habitats although the requirements of each species differ. All of these species are also geographically widespread, common species.

Examples of species restricted to a single habitat type are less common. The riparian woodland, a habitat on Vandenberg associated with flowing water, contained the greatest number of amphibian species. A particularly water-dependent amphibian, the red-legged frog (*Rana aurora*) was found only in the riparian woodland, and the aquatic garter snake (*Thamnophis couchi*) was also found only there. The beaver (*Castor canadensis*), an introduced species, was the only mammal that was restricted to the riparian woodland community, but 14 species of birds were found exclusively there, probably because of the presence of trees and dense cover (Table C-2). No amphibians, one reptile, the ringneck snake (*Diadophis punctatus*), one mammal, the grey fox (*Urocyon cinereoargenteus*) and four species of birds were restricted to the chaparral community (Table C-2). No amphibians or reptiles and only one species of mammal, the broad-footed mole (*Scapanus latimanus*) were found exclusively in the coastal sage community. The only nonavian vertebrate restricted to the stabilized dune community was the California legless lizard (*Anniella pulchra*), a sand-dwelling species. The bird data from the coastal sage and stabilized dune communities were pooled by Coulombe and Cooper (1976). Only two bird species were restricted to those communities (Table C-2), and both were probably dependent on the coastal sage vegetation, and therefore, could not be considered as characteristic of the stabilized dunes. No nonavian vertebrates were restricted to the annual grassland, but eight of the bird species were found exclusively there (Table C-2). Several of those species probably nested in habitats not under consideration here and fed in the grassland. The yellow-billed magpie (*Pica nuttalii*) was restricted to the grassland community. In addition, the red-winged black bird (*Agelaius phoeniceus*), the roadrunner (*Geococcyx californianus*), the western meadowlark (*Sturnella neglecta*), and the rock dove (*Columba livia*) were not reported from any other community on Vandenberg AFB. A few well-known vertebrate species were observed in only two of the five communities [i.e., the common kingsnake (*Lampropeltis getulus*) and the starling (*Sturnus vulgaris*) in the coastal sage and annual grassland, the badger (*Taxidea taxus*) in the chaparral and stabilized dunes, and the feral pig (*Sus scrofa*) in the riparian woodlands and stabilized dunes]. Other species, such as the mountain lion (*Felis concolor*) and the western spotted skunk (*Spilogale gracilis*) may have occurred in one or more of the communities but were not observed. With the exception of the yellow-billed magpie and the California legless lizard, the above mentioned species, although restricted to a single habitat type on Vandenberg, tend to be either geographically widespread, and/or to be found in a number of different habitat types over their range.

Table C-2. Bird species of five plant communities in candiate siting areas on Vandenberg. An X indicates that the species was found in the community, and an asterisk indicates that the species was found exclusively in the community. RW = riparian woodland; CH = chaparral; CSS = coastal sage scrub; SD = stabilized dune; AG annual grassland. See Coulombe and Cooper (1976) and Coulombe and Mahrdt (1976) for the original data and scientific names.

SPECIES	RW	CH	CSS-SD	SD
Turkey vulture	X	X	X	X
White-tailed kite	X			X
Marsh hawk	X		X	X
Red-tailed hawk	X	X	X	X
American kestral			X	X
Killdeer	X*			
California quail	X	X	X	X
Rock dove				X*
Mourning dove	X	X		X
Roadrunner				X*
Great horned owl	X*			
Anna's hummingbird	X	X		
Allen's hummingbird	X*			
Common flicker		X*		
Downy woodpecker	X*			
Nuttall woodpecker	X*			
Western flycatcher	X	X	X	
Western wood peewee				X*
Black phoebe	X*			
Rough-winged swallow	X*			
Tree swallow	X*			
Cliff swallow	X		X	
Scrub jay		X	X	
Yellow-billed magpie				X*
Crow	X		X	X
Bush-tit	X	X	X	
Wren-tit	X	X	X	X
Bewick's wren	X	X	X	X
Mockingbird		X		
California thrasher		X	X	
Hermit thrush	X*			
Western bluebird		X		X
Ruby-crowned kinglet	X*			
Blue-gray gnatcatcher	X*			
Loggerhead shrike		X	X	X
Yellow warbler	X*			
Yellow-rumped warbler	X*			
Yellow-throat	X*			
Wilson's warbler	X	X		
Western meadowlark				X*
Starling		X		X
Red-winged blackbird				X*
Brewer's blackbird				X*
Brown-headed cowbird				X*
Purple finch			X*	
Black-headed grosbeck	X	X		
Lazuli bunting		X*		
House finch	X		X	X
Lesser goldfinch	X			X
Rufous-sided towhee		X	X	
Brown towhee	X	X	X	X
Lark sparrow		X		X
Dark-eyed junco		X		
Golden-crowned sparrow			X*	
White-crowned sparrow		X	X	X
Song sparrow	X	X		

The mule deer and feral pig are the two important species of big game on Vandenberg AFB. The deer herd is large enough to create a nuisance factor in the maintenance of the base. Coulombe and Cooper (1976) reported that the riparian woodland and chaparral supported the highest and the annual grassland the lowest densities of deer, although the extensive areas of annual grassland mean that the actual number of deer in annual grassland was probably as great as the number in the chaparral and much greater than the number in the riparian woodland. Feral pigs were found primarily in the riparian woodland. Upland game species of importance are the California quail, mourning dove, brush rabbit, desert cottontail, and black-tailed jackrabbit. No data are available on the relative abundances of the three rabbits, but the brush rabbit would prefer areas of heavy brush such as riparian woodland and chaparral; the jackrabbit would prefer more open areas an in annual grassland, and the desert cottontail would have preferences intermediate between those of the other two species. The California quail and the mourning dove are most abundant in the annual grassland which probably provides a source of abundant seeds.

Among the nongame species of particular interest are the coyote, bobcat and grey fox, important predators that probably play a role in regulating small mammal populations. Coulombe and Cooper (1976) found that all three species were abundant on Vandenberg although the grey fox was confined to the chaparral community. The beaver, an introduced species, was present only in the riparian woodland and could potentially deleteriously affect important watersheds in the area. The deer mouse was the most abundant nocturnal rodent in all communities, and the California ground squirrel, the major diurnal rodent, was conspicuous throughout the area. The most common bird species in each community were the house finch in the riparian woodland, the starling in the chaparral, the California quail in the coastal sage and stabilized dunes, and the red-winged blackbird in the annual grassland. Most species of large raptors were seen in all or most of the communities under consideration. Many nested in the larger trees in the riparian woodland and foraged in more open areas of coastal sage and annual grass.

Table C-3 presents a characterization of the vertebrate faunas of the communities of interest by food habits. It is presented to determine whether any patterns exist with respect to food resources. In the category "herbivores" are included all of the species which feed predominantly or entirely on plant material. Herbivores have been subdivided into two categories: "granivores", species that eat primarily seeds, and "foliavores," species that eat leaves and stems. The two hummingbirds, both nectar feeders, are also included in the general category "herbivore." Those animals that eat animals have been divided into "insectivores," species that eat mostly insects and other arthropods, and "carnivores," defined here as species that eat other vertebrates. Finally, we have provided a category "omnivore" for those species that eat about equal amounts of plant and animal material. Some of the species found within the communities were not easy to place in these categories, so that in a few cases, an over-simplification of primary food habits has resulted.

Table C-3. Numbers of species and percentage of total species of vertebrates in five plant communities on Vandenberg AFB, grouped by trophic category. RW = riparian woodland; CSS = coastal sage scrub; SD = stabilized dune phase of coastal sage scrub; AG = annual grassland. Data are from Coulombe and Cooper (1976).

TROPHIC CATEGORY	RW	CH	CSS	SD	AG
Herbivores	22 (31.9%)	23 (37.1%)	22 (39.3%)	18 (38.3%)	18 (32.7%)
Mammals	13	13	15	11	10
Birds	9	10	7		8
Granivores	9 (13.0%)	11 (17.7%)	10 (17.9%)	9 (19.1%)	10 (18.2%)
Mammals	2	2	3	2	2
Birds	7	9	7		8
Foliavores	11 (15.9%)	11 (17.7%)	12 (21.4%)	9 (19.1%)	8 (14.5%)
Mammals	11	11	12	9	8
Insectivores	29 (42.0%)	23 (37.1%)	17 (30.4%)	14 (29.8%)	20 (36.4%)
Amphibians	5	3	3	2	2
Reptiles	3	5	4	3	4
Mammals	3	3	3	2	3
Birds	18	12	7		11
Carnivores	15 (21.7%)	14 (22.6%)	15 (26.8%)	12 (25.5%)	14 (25.5%)
Reptiles	6	6	7	4	7
Mammals	4	6	4	4	2
Birds	5	2	4		5
Omnivores	3 (4.3%)	2 (3.2%)	2 (3.6%)	3 (6.4%)	3 (5.5%)
Mammals	2	1	0	1	1
Birds	1	1	2		2

In general, the proportions of species in each trophic category were similar in all communities (Table C-3). Especially high was the proportion of insectivorous birds in the riparian woodland. In all communities, the greatest proportion of the vertebrates was insectivorous.

Species diversities for the five communities were determined by Coulombe and Mahrdt (1976). Species diversity has two components; species richness, that is, the number of species present, and species

evenness, the relative abundances of each species (Krebs, 1972; Poole, 1974). For a given species richness, the higher the evenness (or the more equal in numbers are populations of the different species), the higher the species diversity. Examination of species diversity provides a method of gauging the relative complexity of a fauna. In general, more diverse plant communities have more diverse faunas, and greater diversity usually implies a greater complexity of actual or potential interactions in a community. Therefore, a high diversity in a community suggests a more complex set of feeding relationships within the community (Cooke et al., 1968). It has been argued that greater complexity in an ecosystem leads to greater stability (Cooke et al., 1968), but there is, at present, some disagreement as to the generality of that concept (McNaughton, 1977).

The most diverse terrestrial vertebrate fauna, exclusive of birds, was in the chaparral. The most diverse avifauna was found in the combined coastal sage and stabilized dune communities. The least diverse nonavian vertebrate faunas were in the stabilized dune and annual grasslands. Since the stabilized dune and grassland communities are known to be relatively unstable (i.e., these communities would show successional change with time if they were not maintained by man), these observations are consistent with the concept of reduced stability being associated with reduced diversity.

The riparian woodland had the highest species richness of the communities examined. Birds made up the largest portion of the fauna. The community supported large numbers of insectivores, mainly birds, and was important as a source of roosting, perching, and nesting sites for several of the carnivorous birds. The chaparral was also species-rich and contained representatives of most of the herbivorous species recorded from Vandenberg AFB. Insectivores and carnivores were also well-represented in the chaparral. Both of these communities are well-represented in the Burton Mesa CSA. The coastal sage community and the annual grassland were not as species-rich as the riparian woodland or chaparral.

The stabilized dune community best represented on San Antonio Terrace was relatively species-poor, probably a reflection of the special problems related to sand-inhabitance. Relatively few animals are adapted to live in deep sand environments. The lack of extensive contiguous areas of stabilized dunes along the California coast may have prevented the evolution of animals specifically adapted to coastal sand dune habitats as opposed to those species endemic to large areas of interior desert sand dunes.

The annual grassland was also not especially species rich or diverse. Most of the species were either mammals or birds, and most of those were herbivores, predominantly granivores. The grassland is largely a man-induced and maintained community which, if left undisturbed, would likely become coastal sage or chaparral. The species found in the

grassland were not very abundant and most were generalists from nearby communities, that is, species that could invade the seasonally productive annual grassland, utilize its rather ephemeral food resource, and return to environments with less seasonal fluctuation. Some species may also have represented transients or overflow from nearby communities.

The above analysis points up some important facets of community structure relevant to impact analysis. Communities that are complex and relatively stable, either seasonally or successionally (i.e., riparian woodland, chaparral, and coastal sage) tend to have more kinds or organisms within them. The successionally less stable and/or seasonally changing communities, i.e., stabilized dune and annual grassland, had relatively fewer species, but included a large contingent of seed-eaters. Indeed, the agile kangaroo rat *(Dipodomys agilis)* reached its greatest relative abundance in the stabilized dune community (Coulombe and Mahrdt, 1976). The more stable riparian woodland, with its lower production of seed-producing annual plants, had fewer granivores but more foliavores and insectivores. Avian carnivores, on the other hand, were about equally common in reparian woodland and annual grassland. These large, predatory birds may be able to hunt more effectively in open grasslands, but they usually perch and nest in more arboreal habitats. The relative abundances of some of the mammals were low in the grasslands which may have reflected the relatively high predator pressure in that habitat, as well as the extreme seasonality of the food base and disturbance factors (Schnell, 1968; Beatley, 1976). The more complex scrub and woodland habitats provided both protection from predators (cover) and a more reliable and diverse food base.

Any habitat manipulation that would tend to modify the plant community would likely also modify the vertebrate faunas (Adams and Barret, 1976; Beatley, 1976) which would, in turn, affect other nearby communities. The interdependence of some of the communities can be demonstrated with the following example. The white-tailed kite is thought to be highly dependent on the California vole for food. The vole feeds largely upon annual grasses and forbs, such as are found in annual grasslands (Gill, 1977). On Vandenberg AFB, the California vole was most abundant in the coastal sage and least abundant in the stabilized dune community, while the white-tailed kite was most abundant in the riparian woodland probably because of the presence of trees in which to perch and nest (Grinell and Miller, 1944). The kite was found in lower numbers in the annual grassland, the habitat in which it commonly hunts. It is probable that the predator pressure in the annual grassland decreased the number of voles in that community (Schnell, 1968). The existence of nearby coastal sage may have provided a necessary reservoir of voles, and riparian woodland would have been necessary as nesting habitat for the kites. This is only one of many possible examples of intercommunity species interactions that could demonstrate the strong interdependence of natural communities.

The five plant communities on Vandenberg AFB have vertebrate faunas that are, in general, characteristic of similar areas at other points along the California coast (Ingles, 1965; Jaeger and Smith, 1966; Stein and Kreppert, 1971). The faunas represent remnants of those that were once characteristic of extensive areas of coastal southern California. The relatively large amount of undisturbed habitat on Vandenberg makes the maintenance of the natural communities under consideration important to the preservation of California wildlife.

The comparisons between habitat types made in this analysis serve to show little difference between the vertebrate faunas of the different habitat types that are significant in determining impacts. The importance of riparian woodland to the vertebrate fauna is significant in view of the limited areal extent of this community type on Vandenberg. Riparian woodland is probably necessary to the maintenance of a high diversity of birds, including raptors, on Vandenberg. Its occurrence in the Candidate Siting Areas is limited to the large unnamed canyon on Burton Mesa CSA and to pockets among the sand dunes in the southwestern corner of the San Antonio Terrace CSA. (Conceptual facilities layouts for the different Candidate Siting Areas do not impinge on this type.) Neither the stabilized dune phase of coastal sage scrub nor the chaparral communities best represented in the San Antonio Terrace CSA and Burton Mesa CSA respectively have particularly unique or sensitive vertebrate faunal features in spite of the uniqueness of their vegetation and flora. Both of these habitat types and presumbly their faunas are relatively close to being representative of pre-settlement California, however, and would take a moderately long period of time to recover from disturbance. From a faunal perspective, of the communities under consideration, disturbance of portions of annual grassland which is extensive on Vandenberg, maintained by man, and which recovers rapidly from disturbance, would probably have the least significant effects on the vertebrate fauna of Vandenberg.

D

STATUS OF SPECIAL INTEREST PLANT AND WILDLIFE SPECIES OCCURRING ON OR NEAR MX CANDIDATE BASING MODE COMPARISON AREAS

D

STATUS OF SPECIAL INTEREST PLANT AND WILDLIFE SPECIES OCCURRING ON OR NEAR MX CANDIDATE BASING MODE COMPARISON AREAS

FLORA

Montane species are not included. Species marked "E" are those listed in "Proposed Endangered Status for 1700 Vascular Plant Taxa" (Federal Register June 16, 1976). Species marked "T" are those listed in "Review of Status of Over 3,000 Vascular Plants. . ." (Federal Register July 1, 1975).

1. CENTRAL NEVADA GREAT BASIN BMCA

FAMILY	SPECIES	STATUS
Asteraceae	*Erigeron ovinus*	T
	Erigeron uncialis var. conjugans	T
	Haplopappus brickelloides	T
	Machaeranthera grindelloides, var. depressa	T
	Perityle megalocephala	T
	Senecio lynceus var. leucoreus	T
Brassicaceae	*Lepidium nanum*	T
Cactaceae	*Opuntia pulchella*	T
Ephedraceae	*Ephedra funerea*	T
Fabaceae	*Astragalus callithrix*	T
	A. funereus	T
	A. lentiginosus var. sesquimetralis	T

FAMILY	SPECIES	STATUS
	A. nyensis	E
	A. porrectus	E
	A. pseudiodanthus	T
	A. pterocarpus	T
	Dalea kingii	T
	Lathyrus hitchcockianus	E
	Lupinus holmgrenanus	T
Gentianaceae	*Frasera gypsicola*	E
Hydrophyllaceae	*Phacelia glaberrima*	T
Nyctaginaceae	*Mirabilis pudica*	T
Papovaraceae	*Arctomecon merriamii*	E
Polemoniaceae	*Gilia nyensis*	T
	G. ripleyi	T
	Phlox gladiformes	T
Polygonaceae	*Eriogonum concinnum*	T
	E. ovalifolium var. caelestinum	T
	E. rubricaule	T
Scrophulariaceae	*Penstemon arenarius*	T
	Penstemon rubicundus	E

II. CALIFORNIA MOJAVE DESERT BMCA

FAMILY	SPECIES	STATUS
Apiaceae	*Cymopterus deserticola*	T
	Erigeron parishii	T
	Haplopappus brickelloides	T
Brassicaceae	*Arabis shockleyi*	T
Fabaceae	*Astragalus jaegerianus*	E
	Dalea arborescens	T
Gentianaceae		
Lennoaceae		
Liliaceae	*Calchortus striatus*	T
Papaveraceae	*Arctomecon merriamii*	T

FAMILY	SPECIES	STATUS
Poaceae	*Puccinellia parishii*	T
Polemoniaceae	*Linanthus maculatus*	T
Polygonaceae	*Chorizanthe spinosa*	E
	Erigonum bifurcatus	T
Scrophulariaceae	*Penstemon calcareous*	T

III. LUKE AFR/YUMA TEST SITE

FAMILY	SPECIES	STATUS
Apocynaceae	*Amsonia palmeri*	T
Asteraceae	*Erigeron lobatus*	T
Loasaceae	*Mentzelia nitens* var. *leptocaulis*	E
Scrophulariaceae	*Penstemon bicolor* var. *roseus*	T

IV. WHITE SANDS MISSILE RANGE

FAMILY	SPECIES	STATUS
Asteraceae	*Perityle lemmoni*	T
	Perityle staurophylla var. *homoflora*	T
Cactaceae	*Coryphantha sneedii* var. *sneedii*	T
	Echinocereus lloydii	E
	Pediocactus papyracanthus	T
Fabaceae	*Astragalus castetteri*	E
	Petalostemum scariosum	E
Plumbaginaceae	*Limonium limbatum*	T
Polygonaceae	*Eriogonum gypsophilum*	E

V. WEST TEXAS BMCA

FAMILY	SPECIES	STATUS
Asteraceae	*Brickellia viegensis*	E
	Perityle vitreomontana	E
	Senecio warnockii	T
	Viguiera ludens	E
Brassicaceae	*Lesquerella valida*	E
Cactaceae	*Coryphantha hesteri*	T
	C. minima	E
	Echinocereus chloranthus var. *neocapillus*	E
	E. lloydii	E
	E. viridiflorus var. *davisii* (=*E. davissi*)	E
	Thelocactus bicolor var. *flavidispinus*	T
Caryophyllaceae	*Paronychia wilkinsonii*	T
Chenopodiaceae	*Suaeda duripes*	E
Lamiaceae	*Hedeoma pilosum*	E
Orchidaceae	*Hexalectris nitida*	T
Ranunculaceae	*Aquilegia hinckleyana*	E

VI. TEXAS HIGH PLAINS REGION

FAMILY	SPECIES	STATUS
Cyperaceae	*Eleocharis cylindrica*	E
Polygonaceae	*Eriogonum correllii*	T

SOUTH PLATTE PLAINS

No plant species occurring on the above mentioned lists is known to occur in this BMCA.

FAUNA

This section provides an expanded discussion of the animal species in each Basing Mode Comparision Area (BMCA) which are protected by state or federal law as threatened or endangered species. An Endangered Species is a species or subspecies which has been determined to be threatened with extinction in part or all of its range. The Threatened classification refers to species which may become endangered in the foreseeable future. The Federal Endangered Species Act and its enabling regulations utilize these designations as do many of the state regulations pertaining to rare species. Table D-1 indicates the state equivalents of these designations as used in this report.

The environmental analysis of the various MX basing options has been focused on seven BMCAs which are representative of potential siting areas. The present analysis identifies the protected species likely to be present in these BMCAs in order to assess potential impacts of deploy- of the various MX basing options. Deployment of the MX System will require a more exhaustive assessment of the potential impacts to protected and rare species in candidate siting areas for the selected basing mode.

Information on the distribution and basic biology of endangered species is expanding rapidly and this list of protected species is growing. At this time of this writing (June, 1978) over 100 species are pending or proposed for protection under the federal law. Environmental assessment for deployment of MX will be undertaken with the information available at that future time. Indication of potential for significant impact to any of these species will initiate consulation with the U.S. Fish and Wildlife Service to prevent jeopardizing these species.

The following species are considered endangered or threatened by state or federal law and are those species which are likely to breed in or near the BMCAs.

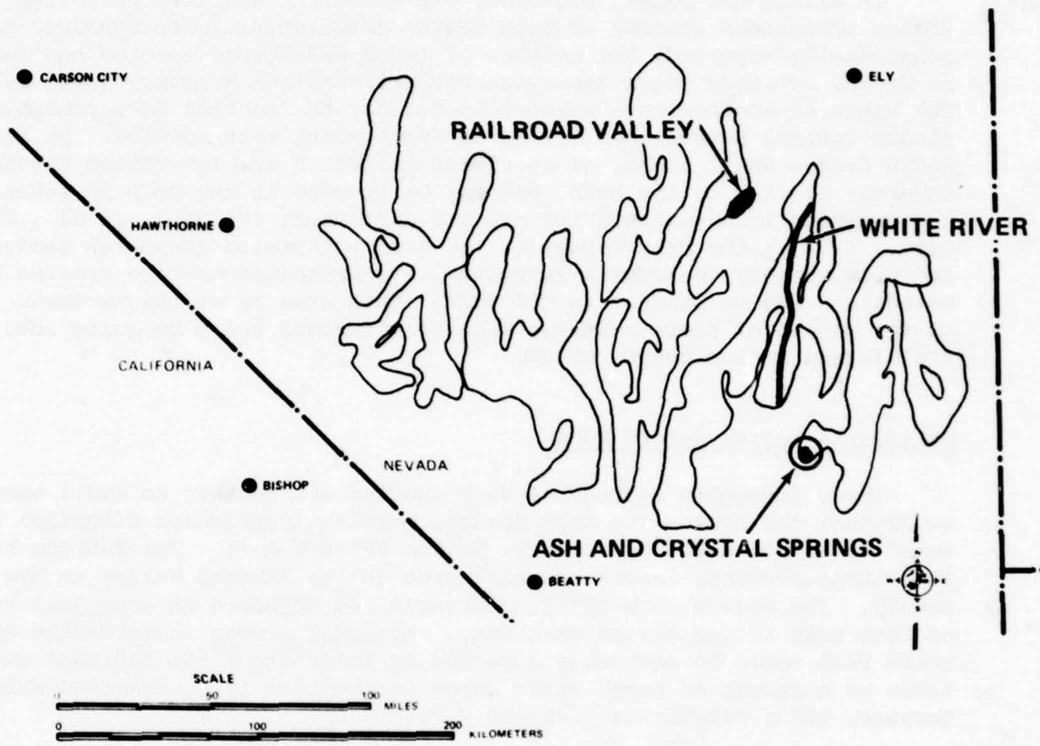
Central Nevada Great Basin BMCA

The endangered Pahranagat bonytail fish (*Gila robusta jordani*) is federally protected and is restricted to Ash and Crystal Springs

Table D-1. State equivalents of federal designations of threatened and endangered animal species.

STATE	STATE EQUIVALENTS OF FEDERAL DESIGNATION	
	ENDANGERED	THREATENED
Arizona	Group II	Group III
California	Endangered	Rare
Colorado	Endangered	Threatened
Kansas	Endangered	Threatened
Nebraska	Endangered	Threatened
Nevada	Endangered	Rare
New Mexico	Group I	Group II
Texas	Endangered	Protected Nongame

(Figure D-1) in the Pahranagat Valley of Lincoln County, Nevada. These springs are in the White River drainage system, upstream from the Pahranagat Lakes, and only a few miles south of the BMCA border. Five species potentially affected by the project (Figure D-1) are protected as rare by Nevada a status equivalent to the threatened category of other states (Nevada Board of Game and Fish Commissioners, Gen. Reg. 1(8), 6 March, 1978). The White River system includes several endemic species including the White River spenedace (*Lepidomeda albivallis*), White River sucker (*Pantosteus intermedis*), and the White River springfish (*Crenichthys baileyi*). The flow of the White River is intermittent south of Preston, Nevada (due to water withdrawals for irrigation), and these fishes are restricted to warm-water springs within 20 to 30 mi of the river channel. The sucker and spinedace are found between the towns of Preston and Sunnyside, while the springfish ranges between Preston and Hiko (Nevada Fish and Game, 1978). The BMCA includes about half of the range of each of these species. The Railroad Valley springfish (*Crenichthys nevadae*) is known only from Railroad Valley. While two populations have been introduced west of the BMCA (south of Mina, Nevada), the BMCA encloses most of the range of the species (Nevada Fish and Game, 1978). As is the case for fishes dependent on springs in other BMCAs, the greatest threat to these species would be drying of springs due to lowering of the water table, which could result from drought or greatly increased groundwater use in the region (Nevada Fish and Game, 1978; U.S. Fish and Wildlife Service, 1973).



LOCATION	PROTECTED* SPECIES PRESENT
ASH AND CRYSTAL SPRINGS	HABITAT AND ENTIRE RANGE OF THE PAHRANAGAT BONYTAIL (FED., END.)
WHITE RIVER	HABITAT FOR ENDEMIC SPECIES OF SPRINGFISH, SPINEDACE, AND SUCKER (ST., THR.)
RAILROAD VALLEY	HABITAT AND ENTIRE RANGE OF THE RAILROAD VALLEY SPRINGFISH (ST., THR.)
OTHER SPECIES PRESENT BUT RARE THROUGHOUT BMCA: SPOTTED BAT (ST., THR.).	

*FEDERAL (FED.) OR STATE (ST.) CLASSIFICATION AS ENDANGERED (END.), THREATENED (THR.), OR EQUIVALENT.

372P-914-1

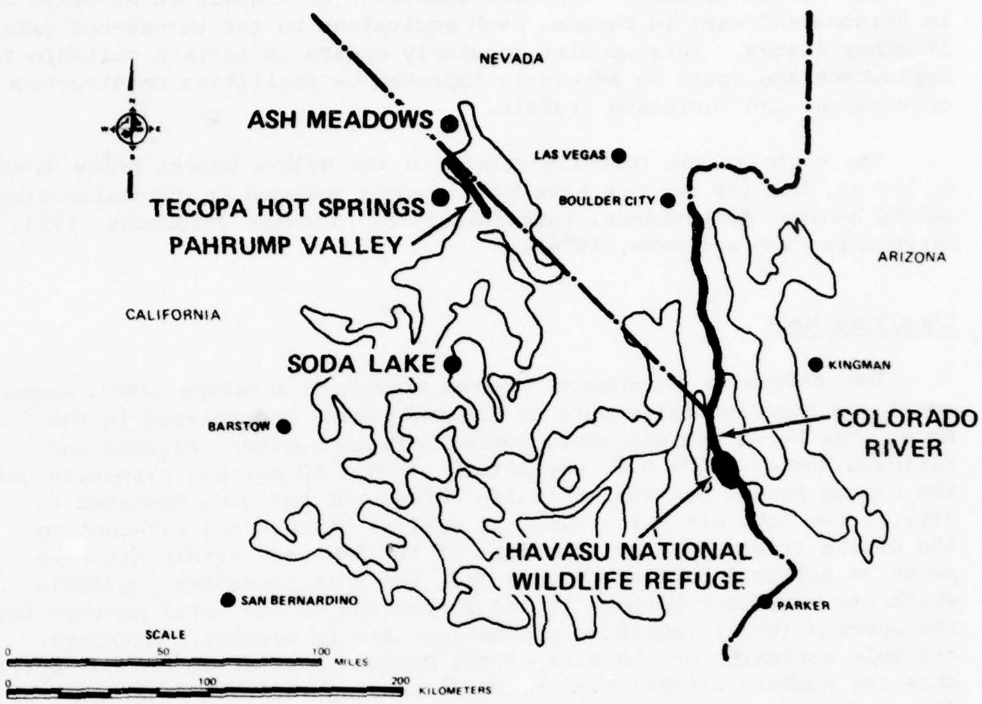
Figure D-1. Habitats of protected* animal species in or near the Central Nevada Great Basin BMCA.

In all of the BMCAs, migratory and wintering American peregrine falcons *(Falco peregrinus anatum)* or bald eagles (*Haliaeetus leucocephalus)* are occasionally reported, but neither of these endangered species has nested in Nevada for many years (American Peregrine Falcon Recovery Team, 1978b) The range of another rare species in Nevada, the spotted bat, probably includes Central Nevada, but little is known about this species. It is known from a small number of specimens collected in high-walled canyons in areas similar to the BMCA, and may be present in the BMCA in areas topographically unsuitable for project deployment (Findley, et al., 1975; Davis, 1974). The other species, the desert tortoise (*Gopherus agassizi)* and Gila monster (*Heloderma suspectum)* are protected as rare species by Nevada and may be present in the BMCA. This area is at the northern limits of the ranges of these reptiles and their numbers would be quite low. (California Mojave Desert BMCA).

California Mojave Desert BMCA

Three federally endangered fish species are endemic to small springs in or near the BMCA. The Warm Springs pupfish (*Cyprinodon diabolis*) is found in Ash Meadows, Nye County, Nevada (Figure D-2). The Pahrump killifish (*Empetruchthys latos*) is restricted to the Pahrump Valley in Nye County. The Mojave chub (*Gila mohavensis*) is found in an area just West of Soda Lake in San Bernadino County. Although present outside the BMCA, these fish could be seriously impacted by lowering of the regional water table as a result of heavy water usage in the area (U.S. Fish and Wildlife Service, 1973; California Fish and Game, 1976).

Three endangered bird species occur in the area but are not likely to be influenced by the project. The Yuma clapper rail *(Rallus longirostris yumanensis)* nests and feeds in marshes along the margins of the lower Colorado River near the BMCA. The Colorado River also contains the bonytail chub and razorback sucker proposed respectively for endangered and threatened federal status. The northern half of the Havasu National Wildlife Refuge lies between portions of the BMCA, and is a nesting area for the Yuma clapper rail. Data for the 1978 annual census of the rail population are not yet available, but in previous years, 200 to 230 individuals have nested in the refuge, although the area is near the northern limit of the range for the species (Havasu National Wildlife Refuge, 1978; California Fish and Game, 1976). Bald eagles (*Haliaeetus leucocephalus*) and American peregrine falcons (*Falco peregrinus anatum)* are occasionally reported for the BMCA but only during migratory periods. Neither species nests in the region of the BMCA due to lack of suitable habitat (California Fish and Game, 1978, 1976).



LOCATION	PROTECTED* SPECIES PRESENT
ASH MEADOWS	HABITAT AND ENTIRE RANGE OF THE WARM SPRINGS AND DEVIL'S HOLE PUPFISHES (FED., END.).
PAHRUMP VALLEY	HABITAT AND ENTIRE RANGE OF THE PAHRUMP KILLIFISH (FED., END.)
SODA LAKE	HABITAT AND ENTIRE RANGE OF THE MOJAVE CHUB (FED., END.)
HAVASU NATIONAL WILDLIFE REFUGE	HABITAT AND NESTING AREA OF THE YUMA CLAPPER RAIL (FED., END.)
OTHER SPECIES PRESENT BUT RARE THROUGHOUT BMCA: DESERT TORTOISE (ST., THR.).	

*FEDERAL (FED.) OR STATE (ST.) CLASSIFICATION AS ENDANGERED (END.), THREATENED (THR.) OR EQUIVALENT.

372P-915-1

Figure D-2. Habitats of protected* animal species in or near the California Mojave Desert BMCA.

The desert tortoise (*Gopherus agassizi*) is classified as Class III in Arizona and rare in Nevada, each equivalent to the threatened category of other states. This species regularly occurs in terrain suitable for deployment and could be adversely impacted by facilities construction, operations, and increased traffic.

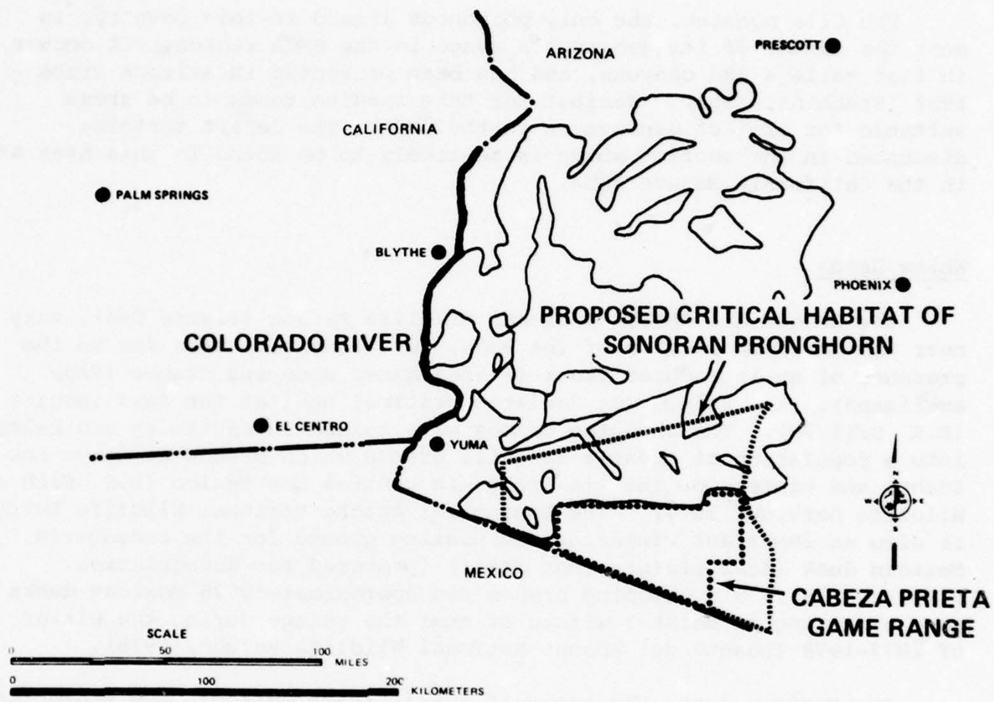
The tortoise was formerly common in the Mojave Desert below 3,500 ft (1,100 m), but its numbers have been greatly reduced by overcollecting and by habitat disturbance, particularly by highways (Stebbins, 1954, California Fish and Game, 1976).

Luke/Yuma BMCA

The federally endangered Sonoran pronghorn antelope (*Antilocapra americana sonoriensis)* occurs on lowland plains and valleys in the BMCA. The herds are migratory moving between southern Arizona and northern Mexico. The U.S. population of 50 - 60 animals primarily uses the Cabeza Prieta National Wildlife Refuge but has been observed to utilize the Luke Air Force Range as well as other areas adjacent to the Cabeza Prieta Refuge. Portions of the BMCA are within areas proposed as critical habitat (Figure D-3) for this pronghorn population which may represent between 10 and 50 percent of the total numbers for the species (Other remaining populations are in Mexico). Although reliable estimates of the size of the Mexican population are not available the numbers are believed to be decreasing (Arizona Department of Game and Fish, 1977; U.S. Fish and Wildlife Service, 1973, 1977). The pronghorn range over very large areas due to the extremely low productivity of the range. Thus, this species may be quite sensitive to exclusion by fencing of a portion of their range. These pronghorn do not appear to be greatly tolerant of human activity and it is likely that construction activities would prevent use by the pronghorn of a portion of the area.

Other protected species are associated with the Colorado and Gila rivers. The endangered Yuma clapper rail (*Rallus longirostris yumanensis)* nests in marshes along these rivers. One of three areas of concentration of these birds is the Imperial National Wildlife Refuge adjacent to the BMCA, north of Yuma, Arizona (U.S. Fish and Wildlife Service, 1973). The bonytail chub (*Gila elegans*) and razorback sucker (*Xyrauchen texanus*) persist in the region of the BMCA and have been proposed for federal status as endangered and threatened, respectively. Several other rare fishes occur in these rivers, but none are likely to persist in portions of the river adjacent to the present BMCA (Rinne, 1976; U.S. Fire and Wildlife Service, 1973; Miller, 1972.

In recent years, there have been no reports of nesting by federally endangered bald eagles *(Haliaeetus leucocephalus)* or American peregrine falcons (*Falgo peregrinus anatum)* in the region of the BMCA, although migratory individuals are not uncommonly present (American Peregrine Falcon Recovery Team, 1978a).



LOCATION	PROTECTED* SPECIES PRESENT
CABEZA PRIETA GAME RANGE AND ADJACENT AREAS	SONORAN PRONGHORN (FED., END.), PROPOSED CRITICAL HABITAT
COLORADO RIVER	YUMA CLAPPER RAIL (FED., END.)
OTHER SPECIES PRESENT BUT RARE THROUGHOUT BMCA: DESERT TORTOISE (ST., THR.), GILA MONSTER (ST., THR.).	

*FEDERAL (FED.) OR STATE (ST.) CLASSIFICATION AS ENDANGERED (END.), THREATENED (THR.), OR EQUIVALENT.

372P-913

Figure D-3. Habitats of protected* animal species in or near the Luke/Yuma BMCA.

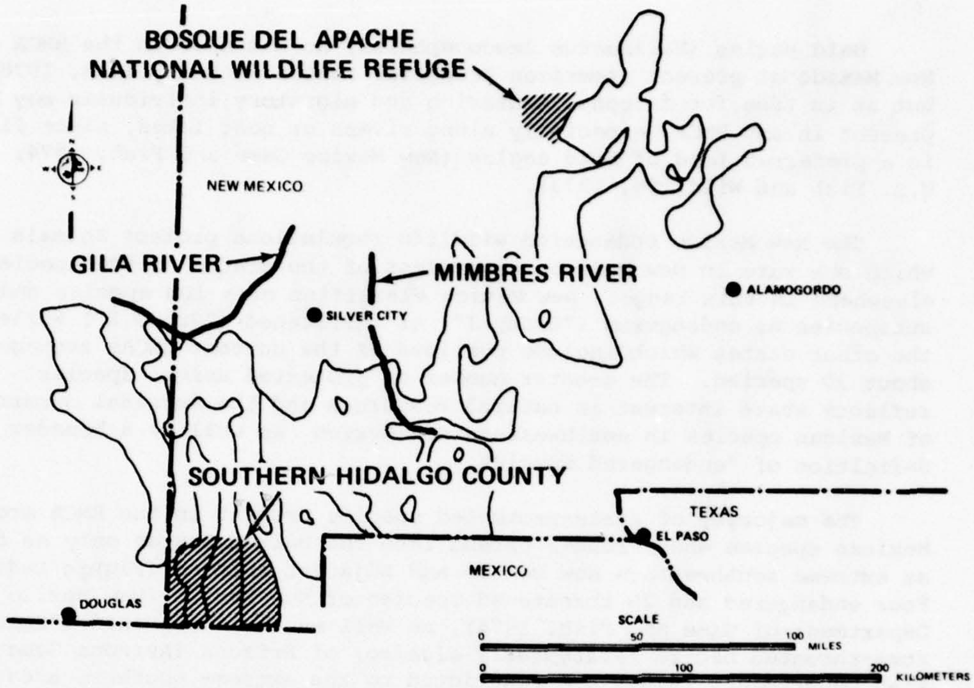
The only additional protected species present in the BMCA are the threatened (Arizona Class III) desert tortoise (*Gopherus Agassizi*) and Gila monster (*Heloderma suspectum*).

The Gila monster, the only poisonous lizard in this country, is near the center of its geographic range in the BMCA region. It occurs in flat valleys and canyons, and has been protected in Arizona since 1952 (Stebbins, 1954). Habitat for this species tends to be areas suitable for project deployment in the BMCA. The desert tortoise discussed in the section above is as likely to be found in this area as in the California Mojave BMCA.

White Sands

The Bosque del Apache National Wildlife Refuge (Figure D-4), very near the northern portion of the BMCA, is a sensitive area due to the presence of an introduced flock of endangered whooping cranes (*Grus americana*). The refuge was declared critical habitat for this species (F.R. 5/15/78). The whooping cranes were raised in captivity and released into a population of greater sandhill cranes which breeds at Grays Lake, Idaho, and winters on the Rio Grande in central New Mexico (U.S. Fish and Wildlife Service, 1977). The Bosque del Apache National Wildlife Refuge is also an important wintering and nesting ground for the endangered Mexican duck (*Anas platyrynchos diazi*) (proposed for deregulation, F.R. 3/31/78). Six whooping cranes and approximately 25 Mexican ducks were wintering in marshes within or near the refuge during the winter of 1977-1978 (Bosque del Apache National Wildlife Refuge, 1978).

The Mexican duck, Mexican wolf (*Canis lupus baileyi*, now protected with all wolves as *Canis lupus*, F.R., 3/9/78), and the thick-billed parrot, all endangered species, are primarily Mexican species and are at the periphery of their range in the southernmost portion of the BMCA (Findley et al., 1975; Robbins et al., 1966). While the thick-billed parrot has not been reported in the U.S. for many years (Arizona Game and Fish, 1978) and the Mexican wolf is considered unlikely (New Mexico Game and Fish, 1976), these species, if present in New Mexico, might appear in or near the BMCA in southern Hidalgo County (Figure D-4). The reported individuals appear to be casual visitors from Mexican populations rather than residents of the BMCAs. This BMCA has a higher probability of containing nesting American peregrine falcons (*Falco peregrinus anatum*) than any other. Two active aeries are known in southwestern New Mexico and more are likely (American Peregrine Falcon Recovery Team, 1978a), although exact locations of nests have not been published because of the sensitivity of the species and the extremely high worldwide demand for young peregrines for use in falconry. Nesting is on steep cliff faces, usually within 10 mi of water (California Fish and Game, 1978; Stokley, 1961). During migratory periods and during winter, peregrines may be found almost anywhere in the western United States and may be present in any of the BMCAs.



LOCATION	PROTECTED* SPECIES PRESENT
BOSQUE DEL APACHE NATIONAL WILDLIFE REFUGE	WINTERING LOCATION OF WHOOPING CRANES (FED., END.), NESTING AREA OF MEXICAN DUCK (FED., END.)†
SOUTHERN HIDALGO COUNTY, INCLUDING ANIMAS MOUNTAINS, GUADALUPE CANYON, ETC.	HABITAT FOR 33 SPECIES AND SUBSPECIES (ST., END., AND THR.), TWO OF WHICH ARE ENDEMIC. POSSIBLY, PERIPHERAL HABITAT OF THE MEXICAN WOLF (FED., END.)
GILA RIVER	HABITAT OF THE GILA CHUB (ST., END.) AS WELL AS THE ROUNDTAIL CHUB, LOACH MINNOW, AND SPIKEDACE (ST., THR.)
MIMBRES RIVER	HABITAT OF THE CHIHUAHUA CHUB (ST., THR.)
OTHER SPECIES PRESENT BUT RARE THROUGHOUT BMCA: AMERICAN PEREGRINE FALCON (FED., END.), GILA MONSTER (ST., END.), BUFF-BREASTED FLYCATCHER (ST., END.).	

*FEDERAL (FED.) OR STATE (ST.) CLASSIFICATION AS ENDANGERED (END.), THREATENED (THR.), OR EQUIVALENT.
†PROPOSED FOR DEREGULATION MARCH, 1978.

372P-916-1

Figure D-4. Habitats of protected* animal species in or near the White Sands Missile Range BMCA.

Bald eagles (*Haliaeetus leucocephalus*) do not nest in the BMCA or in New Mexido at present (American Peregrine Falcon Recovery Team, 1978a) but as is true for falcons, wintering and migratory individuals may be present in any BMCA, especially along rivers or near lakes, since fish is a preferred food of bald eagles (New Mexico Game and Fish, 1974; U.S. Fish and Wildlife, 1973).

The New Mexico endangered wildlife regulations protect animals which are rare in New Mexico, regardless of the status of the species elsewhere in this range. New Mexico classifies over 100 species and subspecies as endangered ("Group 1") or threatened ("Group 2") while the other states which include portions of the current BMCAs average about 30 species. The greater number of protected animal species reflects state interest in natural resources and the marginal occurrence of Mexican species in southwestern New Mexico, as well as a broader definition of "endangered species."

The majority of state-protected species present in the BMCA are Mexican species whose ranges extend into the United States only as far as extreme southwestern New Mexico and adjacent Arizona (Figure D-4). Four endangered and 28 threatened species of New Mexico (New Mexico Department of Game and Fish, 1974), as well as the threatened ("Group II") rose-throated becard (*Platypsaris algaiae*) of Arizona (Arizona Game and Fish Department, 1976), are restricted to the extreme southern area and northern Mexico. Two localized endemic subspecies in the extreme southern portion of the BMCA are the endangered New Mexican ridge-nosed rattlesnake (*Crotalus willardi obscurus*) and the threatened southern pocket gopher (*Thomomys umbrinus emotus*). The pocket gopher is restricted to the Animas Mountains of southern Midalgo County and the rattlesnake to those mountains and an adjacent range in Mexico (Campbell, 1975; New Mexico Department of Game and Fish, 1978). The ridge-nosed rattlesnake is currently (June, 1978) pending a final rulemaking, designating it as a federal endangered species with critical habitat in high elevations of the Animas Mountains (F.R., 26 May 1977). For many of these protected species, the area of the Peloncillo or the Animas Mountains is their only occurrence in this country.

The Gila monster (*Heloderma suspectum*) and the buff-breasted fly-catcher (*Empidonax fulvifrons*) both protected by New Mexico as endangered species, are more broadly distributed in southern and western New Mexico but are uncommon throughout their ranges.

Rivers in and near the BMCA contain state-protected species. The Gila River system is the habitat for New Mexico's threatened roundtail chub (*Gila robusta*), loach minnow (*Tiaroga cobitus*), and spikedace (*Meda fulgida*) and the endangered Gila chub (*Gila intermedia*) (Figure D-4) The Mimbres River contains the threatened Chihuahua chub (*Gila nigrecens*) (Conway, 1975).

West Texas - Rio Grande Basin BMCA

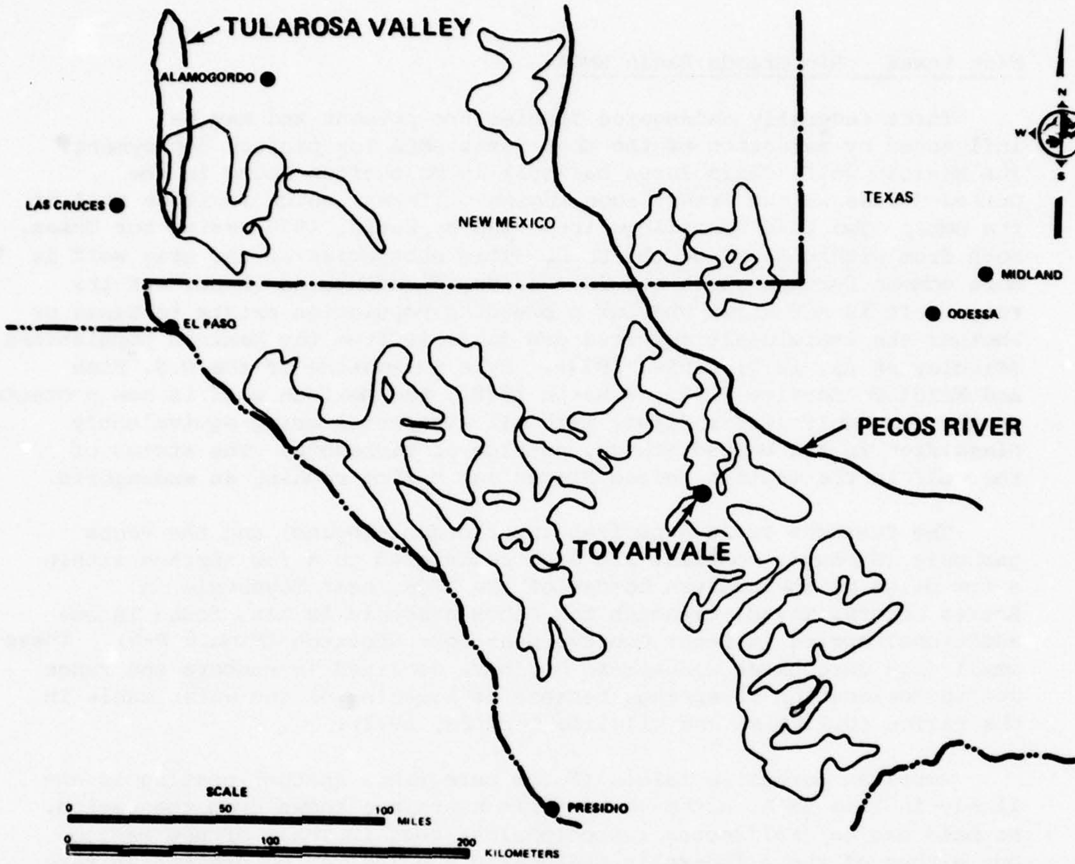
Three federally endangered species are present and may be influenced by selection of the West Texas BMCA for project deployment. The Mexican wolf (*Canis lupus baileyi*) is most often found in the United States in the Trans-Pecos region of Texas, which includes most of the BMCA. Two 1970 recordings (reported by Davis, 1970) exist for Texas, both from within 25 mi of the BMCA. This subspecies of the gray wolf is more common further south but is considered endangered throughout its range. It is not known whether a breeding population exists in Texas or whether the individuals reported are migrants from the Mexican populations (Findley et al, 1975; Davis, 1974). By a rulemaking of the U.S. Fish and Wildlife Service (F.R., 9 March 1978), the Mexican wolf is now protected as the gray wolf (*Canis lupus*) with all subspecies being equivalently classified in the United States, outside of Minnesota. The status of the wolf in the western United States and Mexico remains as endangered.

The Comanche Springs pupfish (*Cyprinodon elegans*) and the Pecos gambusia (*Gambusia nobilis*) are each restricted to a few springs within a few miles of the eastern border of the BMCA, near Toyahvale in Reeves County, Texas, although the Pecos gambusia is also found in one additional spring in Pecos County, near Fort Stockton (Figure D-5). These small fish were never widespread but have declined in numbers and range due to desiccation of springs because of lowering of the water table in the region (U.S. Fish and Wildlife Service, 1973).

American peregrine falcon (*Falco peregrinus anatum*) nesting is unlikely in this BMCA, although historic nests are known from the region. No bald eagles (*Haliaeetus leucocephalus*) nest in Texas or New Mexico, but either of these federally endangered species may be present as rare migrants or wintering individuals (American Peregrine Falcon Recovery Team, 1978a).

Texas and New Mexico each classify a large number of animal species as protected, including populations of species which may be common elsewhere in their range. The New Mexico list includes about 105 species, while that of Texas includes about 130. New Mexico's legal interpretation of endangerment is broader, but Texas has more rare species due to its great size and diversity of topography and habitat.

In addition to the federally protected species, a total of 32 species which occur in the BMCA are classified as Group 1 (endangered) or Group 2 (threatened) by New Mexico, or as protected nongame (threatened) species by Texas. Of these, only three have a large part of their range in the BMCA. The Big Bend canyon lizard (*Sceloporus merriami annulatus*) is found only in central and southern Brewster County, Texas, including the southeastern sections of the BMCA (Texas Parks and Wildlife, 1978a).



LOCATION	PROTECTED* SPECIES PRESENT
TOYAHVALE	COMANCHE SPRINGS PUPFISH (FED., END.), PECOS GAMBUSIA (FED., END.)
TULAROSA VALLEY	WHITE SANDS PUPFISH (ST., THR.), TULAROSA BLACK-TAILED PRAIRIE DOG (ST., THR.)
PECOS RIVER	SEVERAL STATE PROTECTED SPECIES
OTHER SPECIES PRESENT BUT RARE THROUGHOUT BMCA: MEXICAN WOLF (FED., END.), SEVERAL STATE PROTECTED REPTILES.	

*FEDERAL (FED.) OR STATE (ST.) CLASSIFICATION AS ENDANGERED (END.), THREATENED (THR.), OR EQUIVALENT.

372P-917

Figure D-5. Habitats of protected* animal species in or near the West Texas BMCA.

Two species, endemic to the Tularosa Valley west of Alamogordo, New Mexico, are the White Sands pupfish (*Cyprinodon tularosa*) and the Tularosa black-tailed prairie dog (*Cynomys ludovicianus* ssp.) (Hanson, 1977, as reported by New Mexico Game and Fish, 1978). The BMCA includes the southern portion of this valley.

Several protected species which occur in the BMCA are found in larger areas of the southwest than the species discussed previously but are uncommon throughout their ranges. These species include the Texas horned lizard (*Phrynosoma cornutum*), mountain short-horned lizard (*Phrynosoma douglassi hernandesi*), Trans-Pecos rat snake (*Elaphe subocularis*), Baird's rat snake (*Elaphe obsoleta bairdi*), Big Bend milk snake (*Lampropeltis triangulum celaenops*), gray-banded king snake (*Lampropeltis mexicana alterna*), and lyre snake (*Trimorphodon biscutatus*). All are protected as threatened species by Texas. Blanchard's cricket frog (*Acris crepitans blanchardi*) has been designated as threatened by New Mexico. An important cause of depletion of all but the latter of these species has been overcollection for the reptilian pet trade, with several of the above snakes selling at retail prices in excess of $200 per specimen (Texas Parks and Wildlife, 1978a).

Fifteen species of fishes, birds, and reptiles, protected by New Mexico or Texas are present in or along margins of the Pecos River, which flows near portions of the BMCA. All of these species are restricted to the immediate vicinity of the river.

Like the bald eagle, Baird's sparrow (*Ammodramus bairdi*) and McCown's longspur (*Rhyncophanes mccowni*) are both rare in the area as migrants or wintering individuals but do not breed in the BMCA (New Mexico Game and Fish, 1974; Texas Parks and Wildlife, 1978a).

Texas-New Mexico High Plains BMCA

No federally protected species are likely to be impacted by project deployment in this BMCA. The endangered peregrine falcon nests in New Mexico but far to the west of the BMCA (U.S. Fish and Wildlife Service, 1973; Stokley, 1961). These birds are observed in the area occasionally but have not bred there for many years (New Mexico Game and Fish, 1974). The black-footed ferret (*Mustela nigripes*) may persist in the vicinity of the BMCA, but the probability of its presence is much lower than in the South Platte BMCA. Texas has had fewer than 15 official sightings for the state since 1882, the majority from within 100 mi of the BMCA. Despite increased efforts, only three sightings have been recorded in the past decade and none of these within the BMCA boundaries (Texas Parks and Wildlife, 1978b).

There are five species with breeding populations in the BMCA which are classified as threatened by New Mexico Group 2 species or Texas protected nongame species. Of these, only the sand dunes sagebrush lizard (*Sceloporus graciosus arenicolous)* is endemic and restricted to the region of the BMCA and is the species of greatest sensitivity. This lizard is only found on active sand dunes in the Mescalero Sands area of New Mexico and may be present in eastern Chaves County in the southwestern portion of the BMCA (New Mexico Game and Fish, 1974; Stebbins, 1954).

Three reptiles, the Texas horned lizard (*Phrynosoma cornutum)* and the central plains and Big Bend milk snakes (*Lampropeltis triangulum gentilis, L. t. celaenops)* are protected by Texas to stem the heavy collection pressure of the pet trade (Texas Parks and Wildlife, 1978). These species are distributed in several states, as is Blanchard's cricket frog (*Acris crepitans blanchardi)*, which is protected as a threatened species in New Mexico due to its limited distribution in the state.

The Palo Duro mouse (*Peromyscus truei comanche)* is a protected nongame species in Texas which is endemic to the panhandle region. Wooded canyons are the habitat of the Palo Duro mouse, whose range is primarily east of the BMCA (Davis, 1975; Schmidly, 1973).

McCown's longspur *(Ammodrammus bairdi)* and Baird's sparrow (*Rhynchophanes mccowni)* both protected by New Mexico, may occasionally be present in the BMCA as migrants but do not nest in the BMCA (New Mexico Game and Fish, 1974; Stokley, 1961).

South Platte Plains BMCA

The endangered blackfooted ferret (*Mustela nigripes)* is the only federally protected species likely to occur in the South Platte BMCA. This rare weasel was once widely distributed throughout the Great Plains, but is thought to persist primarily in northern regions, especially western South Dakota and Nebraska and southwestern North Dakota (Nebraska Game and Parks Commission, 1978). Large prairie dog towns on rangeland within the BMCA may contain ferrets. Existence of populations has always been difficult to determine because ferrets are nocturnal and rarely leave the burrows which provide shelter and food. A pilot program to train a dog to locate ferrets in the wild is underway in South Dakota, and initial attempts are scheduled for late spring in 1978 (U.S. Fish and Wildlife Service, 1978). If successful, this program would greatly improve the ability to determine presence of ferrets at particular sites and the status of the species. Of 70 sightings in recent years, at least 14 are believed authentic, and a majority of these were in the general vicinity of the BMCA (Nebraska Game and Parks Commission, 1972, 1978).

The endangered American peregrine falcon (*Falco peregrinus anatum*) and bald eagle (*Haliaeetus leucocephalus*) are periodically observed in the BMCA, but are unlikely to nest there (American Peregrine Falcon Recovery Team, 1978a). The American peregrine falcon may no longer nest east of the Rocky Mountains, although an immature, probably migrating, peregrine was observed just north of the BMCA in Garden County, Nebraska, in May 1972 (Shickley, 1972). Migrating eagles are reported from the area frequently, and although classified as endangered federally and by Kansas, it is not granted special protection by the threatened wildlife provisions of Colorado or Nebraska.

Seven animals which may be present in the BMCA are protected under the endangered wildlife provisions of one or more of the three states which contain portions of the South Platte BMCA.

The swift fox (*Vulpes velox*) is protected as an endangered species in Nebraska and occasionally ranges into the area. Its primary range is the sandhills area of Nebraska, but short-grass plains in any part of the BMCA may contain swift foxes (Nebraska Game and Parks Commission, 1977).

The interior least tern (*Sterna albifrons athalassos*) is considered threatened by Kansas and Nebraska. The tern migrates through the BMCA regularly but nests further east on sandbars in the Platte River and probably on the Republican River as well (Nebraska Game and Parks Commission, 1977).

Four protected bird species of the BMCA are grassland inhabitants. The mountain plover (*Charadrius montanus*) is a threatened species in Nebraska and is found in grazed short-grass plains areas. Other grassland areas in the BMCA contain scattered populations of greater prairie chickens (*Tympanuchus cupido*) and sharptailed grouse (*Pedioecetes phasianellus*) which are endangered species in Colorado and game birds in Nebraska. In Nebraska, these species maintain rather stable populations in the sandhills area northeast of the BMCA, although the number of greater prairie chickens may be declining somewhat. The lesser prairie chicken (*Tympanuchus pallidicinctus*), a threatened species in Colorado, is at the northern limit of its range in southern portions of the BMCA. All four of these species have declined due primarily to increased cultivation and heavy grazing throughout their former ranges (Nebraska Game and Parks Commission, 1972).

Like the American peregrine falcon, the prairie falcon (*Falco mexicanus*) is uncommon, but its range includes the entire BMCA. Also a grassland species, the prairie falcon nests on cliffs or steep canyon walls and is protected as a threatened species in Kansas to prevent depredation of populations by falconers (Kansas Forestry, Fish and Game Commission, 1977).

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Advection	The process of transport of an atmospheric property solely by the mass motion (velocity field) of the atmosphere. The description of predominantly horizontal large-scale motions of the atmosphere.
Aggradation (Geology)	The process of building up a surface by continuous or intermittent deposition.
Air Basin	1. Areas having similar meteorological and geographical conditions.
	2. Directive of Mulford-Carrell Act. These basins reflect similarities of air pollution potential because of similar topography, climate, population or other ecological factors.
Air Quality Monitoring Stations	Stations set up at scattered and strategic locations in an area, which continually sample for and measure pollutants which may be present in atmosphere.
Air Quality	Quality of air expressed in terms of concentrations of foreign constituents in the area such as SO_2, particulate, NO_x, CO, etc.
Alfisol	Moist gray-brown clayey soils with medium to high lime content and a clay accumulation, USGS, 1970.
Alluvial Fan	A fan shaped deposit of alluvium (fill) made by a stream where it issues from

Alluvial Fan (Cont'd.)	the mountains unto the lowland. The abrupt decrease of slope reduces the stream's energy and the stream loses its velocity and drops its burden of silt or gravel, which spreads out in an ever widening arc. Over time, this deposition builds up and an alluvial fan is formed.
Ambient Air (Meteorology)	Refers to surrounding external or unconfined conditions, i.e., outdoor air.
Anticyclones and Cyclones	Migrating areas of high pressure (anticyclones) and low pressures (cyclones) and the fronts associated with the latter are responsible for the day to day changes in weather that occur over most of the mid-latitude regions of the earth.
Arborescent (Geology)	1. Syn. for *dendritic*; said of a mineral that has crystallized in a branching pattern.
(Botany)	2. Treelike as in arborescent cactus.
Archaeological Resource	The subclass of cultural history resource planning considerations which include all remaining physical evidence of former occupation by now extinct cultural groups - including skeletons, settlement remains, implements, artifacts, monuments and inscriptions.
Aridisol	(Dry soils with pedogenic horizons and low organic content, USGS, 1970). Aridisols form in desert regions in which the water table lies deep below the surface.
Arroyo	A watercourse or water-carved gully (as a creek or a stream) in an arid region.
A scale measurement (dBA)	A filtered measurement that has characteristics which roughly match the response characteristics of the human ear at low sound levels (below 55 dB SPL, but frequently used to gauge levels to 85 dB). "A" scale measurements are often referred to as dBA.

Ash Fall	A rain of airborne ash.
Aspect	(Exposure Slope Orientation). The compass direction that the slope of a land surface faces.
Badlands	Rough terrain which is intricately dissected by closely spaced valleys that are dry most of the year.
Bajada	An alluvial plain formed at the base of a range of mountains by the coalescing of several alluvial fans.
Basement	(Basement complex, basement rock). An igneous or metamorphic rock complex underlying sedimentary or volcanic rocks.
Batholith	A large, generally discordant, plutomic mass that has more than 40 sq. mi (100 km^2) in surface exposure and is composed predominantly of medium- to coarse-grained rocks of granodiorite and quartz monzonite composition. No visible floor for such a mass has yet been reported. Though a subject of controversy, its formation currently is believed by most investigators to involve magmatic processes.
Block Faulting	A type of normal faulting in which the crust is divided into structural or fault blocks of different elevations and orientations. These structural blocks may be reflected in the land surface either directly if erosion has not had time to plane them down, or indirectly as a result of differential erosion.
Blowout	A characteristic of sandhills. Conical depressions caused by wind erosion.
Bolson	A term applied in the desert regions of the southwest U.S.A. to an extensive flat saucer-shaped, alluvium-floored basin or depression, almost or completely surrounded by mountains from which drainage has no surface outlet as it runs centripetally with gentle gradients toward a playa or central depression; an anterior basin, or a basin with internal drainage.

Caliche (Geology)	A calcium carbonate deposit formed in surficial rocks of arid regions.
Channeling (Meteorology)	Mountains tend to channel the general air flow along a valley axis resulting in a bidirectional wind frequency distribution.
Class II Propellant	Consists of a hydroxyl-terminated polybutadiene (HTPB) binder system, aluminum fuel, and either ammonium perchlorate (AP) or cyclotetramethylene-tetranitramine (HMX) as the oxidizer.
Class VII Propellant	Consists of an undetermined binder system, an aluminum fuel and AP and HMX oxidizers.
Clastic origin	Rocks derived by weathering and erosion of older rocks in cemented sand, silt and clay. Example - conglomerates, breccias, sandstone and shale.
Cuesta	(a) A hill or ridge with a gentle slope on one side and a steep slope on the other; specif. an asymmetric ridge (as in the SW U.S.) with one face (dip slope) long and gentle and conforming with the dip of the resistant bed or beds that form it, and the opposite face (scarp slope) steep or even cliff-like and formed by the outcrop of the resistant rocks, the formation of the ridge being controlled by the differential erosion of the gently inclined strata. Originally, the term applied to the steep slope or scarp that terminates a gently sloping plain at its upper end; the term has also been used to denote the sloping plain itself, such as the top of a mesa. (b) A ridge or belt of low hills formed between lowlands in a region of gently dipping sedimentary rocks (as on a coastal plain), having a gentle slope conforming with the dip of the rocks and a relatively steep slope descending abruptly from its crest.---Etymol: Spanish "flank" or slope of a hill, mount, sloping ground. Cf: hogback. Syn. wold; scarped ridge; escarpment.

Cultural Resource	The physical remains (artifacts), ruins, burial mounds, petroglyphs, etc., and conceptual content or context (as a setting for historic, or prehistoric events) of an area which is useful or important for making land use planning decisions. In the land use planning process it includes (1) "archaeological" resource values associated with former occupancy by native cultural groups; (2) "historical" values dating from just occupancy by native settlers; (3) "relic cultural groups" resource values associated with the existence of native people who continue to live in groups practicing the cultural life styles of their ancestors; and (4) "neoteric" outstanding examples of contemporary culture representing achievements which, in the future, are likely to become historically significant.
Deflation (Terrestrial)	The erosion of soil by the wind.
Dendritic riparian pattern	A pattern of watercourses joining together at acute angles, e.g., as branches of a tree.
Desert Pavement	A relatively thin, fragile surface deposit on alluvial fans in desert regions, consisting of pebble to cobble sized rocks from which all fine interstitial material has been removed by wind erosion.
Desert Varnish	A dark, lustrous coating or crust, usually of manganese and iron oxides, that form on rocks, pebbles, etc., in the desert.
Desert Reparian Associations	Plants or animals which live in groups along the dry desert washes.
Detritus	Loose material resulting from disintegration or wearing away of rock.
Dip Slip Fault	A fault in which the net slip is practically in the line of the fault dip.

Draft	A gully or gorge or a small stream or creek (eastern U.S. regionalism).
Edaphic	A term referring to the soil conditions or types as ecological factors.
Employment Opportunities	Work that would be provided to the construction industry by a proposed project as well as permanent jobs created if permanent employment is involved.
Endangered Species Act of 1973 (PL 93-205; 87 stat 884)	Specifies federally protected endangered species and provides a means whereby ecosystems upon which endangered and threatened species depend may be conserved.
Endangered Species	Those species in danger of extinction throughout all or a significant portion of their ranges. They may be species from very limited areas, e.g., the type localities only, or from restricted fragile habitats. Those species which are likely to become "endangered" are designated as threatened species.
Entisol	In U.S. Dept. of Agriculture Soil taxonomy, soil order characterized by a lack of distinct horizons within a depth of one meter. (Dry soils with no pedogenic horizons).
Environmental Impacts	Resultant changes in the quality of the environment due to specific and summary changes in measurable environmental parameters which are used to describe the existing condition of biological, physical, and socioeconomic sectors.
Environmental Protection Agency	The EPA was established in 1970 by the executive branch of the Federal government as an independent agency. It was created to "permit coordination and effective governmental action to assure the protection of the environment by abating or controlling pollution on a systematic basis" (EPA).

Eolian Deposits	Deposits arranged by the wind, as sands and other loose materials along shores.
Ephemeral Plants	Plants that germinate, produce seed, and die during a period of a few months or less.
Epiphtic (Bio)	A plant which is living on the surface of another plant and deriving its moisture and nutrients from the air and rain.
Evaporites	A nonclastic sedimentary rock composed primarily of minerals produced from saline solutions that became concentrated by evaporation of the solvent; esp. a deposit of salt precipitated from a restricted or enclosed body of seawater or from the water of a salt lake. Examples include: gypsum, anhydrite, rock salt, chemically precipitated limestone, primary dolomite, and various rare nitrates and borates. The term sometimes includes rocks developed by metamorphism or other evaporites.
Faulting (Geology)	The movement which produces relative displacement of adjacent rock masses along a fracture.
Fluvial	Of or pertaining to a river; produced by the action of a stream or river; existing, growing or living in or about a stream or river.
Fossorial	Adapted for digging or burrowing as gophers, moles, etc.
Fugitive Dust	Temporary, transient dust as from construction activities.
Geosyncline	An elongated downwarp or trough in the earth's crust, measured in hundreds of miles, formed as sedimentary and volcanic rocks accumulate to thickness of thousands of yards with progressive subsidence of the basin floor, is subsequently subjected to mountain-building forces and becomes strongly deformed in

Geosyncline (Cont'd.)	fold-mountain chains; the lower portions of the sedimentary pile may become highly metamorphosed and granite emplacement may occur.
Granite Pluton	A body of igneous rock composed of granite or granite-like rock, originally formed by the consolidation of magma in its later phases and predominately composed of quartz and potash feldspar.
Granivorous	Feeding or subsisting on grain, as granivorous rodents or birds.
Habitat	The natural environment of a plant or animal or communities of these species.
Halophytic	Growing in soil or water with a high content of salt.
Hardness (of site)	The ability of a system at a target point to withstand nuclear weapons effects at a select distance from an attacking nuclear burst.
Historic and Cultural Sites	These sites are associated with the history, tradition, or cultural heritage of national, state or local interest and are of enough significance to be considered for preservation or restoration.
Hog back	Any ridge with a sharp summit and steep slopes of nearly equal inclination on both flanks, and resembling in outline the back of a hog; specifically, a long, narrow, sharp-crested ridge formed by the out cropping edges of very steeply inclined or highly tilted resistant rocks (such as igneous dikes); and produced by differential erosion. The term is usually restricted to ridges carved from beds dipping at angles greater than 20^{o}.
Horizon, soil	(a) A layer of soil that is distinguished from adjacent layers by characteristic physical properties such as structure, color or texture. The letters, A, B, and C are used to designate soil horizons.

Horizon, soil (Cont.)	The A layer is the uppermost part. It consists of mineral layers of maximum organic accumulation; or layers from which clay materials, iron and aluminum have been lost; or both. The B horizon lies beneath the A. It consists of weathered material with accumulation of clay, iron or aluminum; or with more or less blocky or prismatic structure; or both. The C horizon under the B, is the layer of unconsolidated, weathered parent material. Not all these horizons are present in all soils. Sometimes the letters <u>O</u> or <u>H</u> are used to designate the unaltered organic debris at the surface. (b) A particular geologic level, with or without thickness
Important Species	Endangered species whose loss can be permanent and can indicate disruption of the ecosystem.
Inflorescences	Clusters of flowers.
Interim Control (Land)	A zoning classification (used in the City of Yuma) for land annexed by the City for which final zoning has not been established by the City Council.
Interior Drainage	(a) Syn. for *internal drainage*; surface drainage whereby the water does not reach the ocean, such as drainage toward the lowermost or central part of an interior basin. It is common in arid and semi-arid regions, as in western Utah. (b) A drainage pattern wherein streams disappear by evaporation and by percolation into their beds and playas, and fail to reach the sea.
Intermontane	Lying between mountains.

Laccolith	A concordant igneous intrusion with a known or assumed flat floor and a postulated dike-like feeder somewhere beneath its thickest point. It is generally lenslike in form and roughly circular in plan, less than 5 mi (8 km) in diameter, and from a few feet to several hundred ft in thickness.
Lacustrine	Pertaining to, produced by, or formed in a lake or lakes; growing in or inhabiting lakes; characterized by lakes or lakebeds.
Lithic Scatter	Archaeologist's term for chips of rock thought to have resulted from human tool making.
Lithology	The study of rocks, the character of a rock formation.
Loess	A homogenous, non-stratified, unindurated deposit consisting predominantly of silt, with subordinate. amounts of very fine sand and/or clay; a rude vertical parting is common at many places.
Man Year	Amount of labor effort from one person during one year. A desirable quantity so that one man year may be one person working for a full year or two people working for a half year each.
Microphyllous (Botany)	Refers to plants (commonly of deserts) having small leaves or leaflets.
Mixing Depth (Atmospheric)	(a) The expanse in which air rises from the earth and mixes with the air above it until it meets air equal or warmer in temperature. (b) That depth of the atmospheric layer in which pollutants can be mixed, dispersed and diluted.
Mollisol	Black, organic rich soil, with high alkaline contents (USGS, 1970).

Multiplier	An economic term used in the estimation of the total amount of economic stimulation in an area resulting from direct expenditures on a project.
Nautical Mile	The geographic (or nautical sea or air) mile equal to 1/60 of 1° of the earth's equator: In U.S. coast survey use, 6,080.2 ft. The British Admiralty specifies 6,080 ft.
Neotropic	The area of the New World extending from the Tropic of Cancer southward.
Noise (Construction)	Probable noise from the men and the equipment used to build a project. This noise may become unreasonable (construction sites may be very noisy), at which time it is termed noise pollution.
Overburden	a) Material overlying a deposit of useful geological materials. b) Material including blast-induced debris covering the missile emergence point.
Pediment	1. Near surface planed bedrock. 2. A broad, flat or gently sloping, rock-floored erosion surface or plain of low relief, typically developed by sub-aerial agents (including running water) in an arid or semiarid region at the base of an abrupt and receding mountain front or plateau escrapment, and underlain by bedrock (occasionally by older alluvial deposits) that may be bare but more often partly mantled with a thin and discontinuous veneer of alluvium derived from the upland masses and in transit across the surface.
Pedimentation	The action or process of formation and development of a pediment or pediments; also the product resulting from such an action or process. The two processes

Pedimentation (Cont'd)	recognized as being most active in pediment formation are lateral, planation by steep-gradient streams, and backwashing and removal of debris by rill wash and unconcentrated flow; the latter process appears to be the most widely accepted. Cf; pediplanation.
Pedogenic	Pertaining to soil formation.
Pedogenic Carbonate	Carbonate formed in the soil.
Piezometric Surface	The surface to which the water from a given aquifer will rise under its full head.
Plant or Animal Communities or Associations	The assemblage of plants and animals inhabiting a specific area.
Playa	The flat-floored bottom of an undrained desert basin that becomes at times a shallow lake (after a rain when water may stand and where its evaporation characteristically leads to alkali deposits).
Propagule	A structure (as a cutting, a seed, or a spore) that propagates a plant; offspring.
Raptor	Refers to predatory birds that are adapted for seizing prey, i.e., bills or claws.
Riparian	(a) Pertaining to or situated on the bank of a body of water, esp. of watercourse such as river. (b) Pertaining to the banks of a body of water.
Riverain	Pertaining to a riverbank; situated on or near a river. The term has a wider meaning than riparian.
Riverine	Of, or pertaining to a river; situated or living along the banks of a river.

Ruderal	Weedy - as weeds of old disturbed fields and roadsides.
Sanitary Landfill - Class I	A site where disposal of toxic or hazardous waste is permitted. Due to the geology and soil characteristics of the area, the groundwater quality is completely protected.
Santa Ana Winds	Local (So. Coast Air Basin) strong winds which pass over the mountain ridges surrounding the Los Angeles Basin and blow sometimes with a gale force down into the leeward lowlands. They bring abnormal temperature rises and dryness.
Seismic Hazards	The danger to the population or resources due to the probability of earthquake shaking and the susceptibility to damage the structures occupied by the population or resource at risk.
Seismic Refraction Studies	A technique for inferring the configuration and properties of subsurface geologic formations by measuring and interpreting the arrival times at a subsurface location of pressure pulses (e.g., generated by an impact or explosion) produced at another location.
Sheet Flow (of runoff)	The rain storm or snow melt runoff water which flows over the ground surface as a thin layer - as opposed to the channelized (concentrated) runoff which occurs in rills and gullies.
Spoil Areas	Storage areas where the soil overburden which is removed as a result of construction or excavation operations is disposed.
Statute Mile	A unit of linear measure used in the United States equal to 1,760 yards (5,280 ft) or one full mile.
Stock	A rudely cylindrical, relatively large igneous intrusion less than 40 square miles in surface exposure and usually

Stock (Cont'd) but not always discordant, resembling a batholith except in size; some may be offshoots of underlying batholiths.

Strike The course or bearing of the outcrop of an inclined bed or structure on a level surface; the direction or bearing of a horizontal line in the plane of an inclined stratum, joint, fault, cleavage plane, or other structural plane. It is perpendicular to the direction of the dip.

Strike Fault A fault whose strike is parallel to the strike of the strata.

Surface Faulting Surface faulting is the relative displacement of the ground surface due to differential slip on a fault plane. This form of ground rupture is limited to the area where the fault plane intersects the ground surface and is different from surface disruptions that are the result of ground shaking. Surface faulting may also occur on splay faults subsidiary to the causative fault. If the fault trace is buried by thick unconsolidated or plastic soils, the relative displacement at depth may be absorbed in deforming the overlying soils without causing surface rupture. Surface evidence of displacement at dept would then manifest itself as warping or folding in the unconsolidated surface materials. No surface faulting has been documented in the Vandenberg area, although the potential for surface faulting exists along the Lions Head Fault, its splay faults, and the Lompoc Fault.

Sympatric Originating in or occupying the same geographical area.

Temperature Inversion An atmospheric condition produced by a set of geologic and atmospheric conditions so as to produce a layer of cool air beneath a layer or layers of air in which temperature increases with altitude.

Terrace (Land)	Relatively flat, horizontal, or gently inclining surfaces, sometimes long and narrow, which are bounded by a steeper ascending slope on one side and by a steeper descending slope on the opposite side.
Terrestrial Ecology	The interrelationships of organisms that live on the earth's surface to one another and their environment.
Tsunami	A great sea wave of seismic origin.
Tuffaceous	Of, or pertaining to volcanic ash generally smaller than 4 microns in diameter and transported by wind or water currents and deposited in layers that may become compacted into a stratified rock (tuff), sometimes classed as sedimentary, not igneous.
Water-bearing Formation	A relative term used to designate a formation that contains considerable gravity groundwater.

E

GLOSSARY 2

GLOSSARY OF STANDARD INDUSTRIAL CLASSIFICATIONS

SIC CODE	INDUSTRY TITLE AND DEFINITION
1900	Ordnance and Accessories: This major group was reclassified in 1972. It became Ordnance and Accessories, Except Vehicles and Guided Missiles (SIC Code 348), Radio and T.V. Communication Equipment (SIC Code 3662), Tanks and Tank Components (SIC Code 3795), Guided Missiles and Space Vehicles (SIC Code 3761), and Optical Instruments and Lenses (SIC Code 3832). All remain part of the Manufacturing division. It included firms which produced tanks and associated components, missiles, guns and artillery, ammunition, and other military supplies.
1925	Complete Guided Missiles: This industry's SIC Code was changed in 1972 to SIC Code 3761. It was part of major group Ordnance and Accessories (SIC Code 1900) which in turn was part of the Manufacturing division. It included firms engaged in research and development, and/or production of entire guided missiles.
2000	Food and Kindred Products: This major group is part of the Manufacturing division. It includes firms manufacturing or processing foods and beverages for human consumption, and certain related products, such as vegetable and animal fats and oils, and prepared feeds for animals and fowls.
2300	Apparel and Other Fabricated Textile Products: This major group is part of the Manufacturing division. It includes firms producing clothing and fabricated products, made by cutting and sewing purchased woven or knit textile fabrics, leather, rubberized fabrics, plastics, and furs. Custom tailors and dressmakers, as well as firms which purchase and resell finished clothing are classified elsewhere.
2819	Industrial Inorganic Chemicals Not Elsewhere Classified: This industry is part of the major group, Chemicals and Allied Products (SIC Code 2400), which in turn is part of the Manufacturing division. Important products in this industry include ammonium perchlorate, fissionable material production, and solid, inorganic fuel propellants.

SIC CODE

3079 Miscellaneous Plastic Products: This industry is part of the major group, Rubber and Miscellaneous Plastic Products (SIC Code 3000) which in turn is part of the Manufacturing division. It is comprised of firms which produce primary and finished plastics for both wholesale and retail markets.

3400 Fabricated Metal Products: This major group is part of the Manufacturing division. It includes firms which produce metal goods such as metal cans, scissors, knives, axes, and other hand tools, fabricated structural products, such as sheet metal work, and military supplies, except vehicles and guided missiles.

3573 Electronic Computing Equipment: This industry is part of the major group Machinery, Except Electrical (SIC Code 3500), which in turn is part of the Manufacturing division. It includes firms producing electronic computers and related equipment for industrial uses and military weapons systems. Products range from analog computers to tabulating machines.

3590 Miscellaneous Machinery, Except Electrical: This industry is part of major group Machinery, Except Electrical. It includes firms producing such goods as pistons, engine valves, and flexible metal hose and tubing.

3600 Electrical and Electronic Machinery, Equipment and Supplies: This major group is part of the Manufacturing division. It includes firms which produce machinery and supplies for generating, storing, transmitting, and utilizing electrical energy. Included would be transformers, switchgear, electric motors, household appliances, electric lighting and wiring equipment; and radio and television electric and electronic receiving and communicating equipment.

3662 Radio and Television Transmitting, Signaling, and Detection Equipment Apparatus: The industry is part of major group Electric and Electronic Machinery, Equipment, and Supplies (SIC Code 3600). It includes firms which produce electric and electronic communication equipment; high energy electronic equipment, such as particle accelerators used in the radiation therapy or cyclotrons; and electronic detection equipment, as those used for navigational and guidance systems on aircraft and missile control systems.

3679 <u>Electronic Components, Not Elsewhere Classified</u>: This industry is part of major group Electrical and Electronic Machinery, Equipment, and Supplies. It includes firms which produce such goods as receiving antennas, printed circuits, switches, magnetic recording tape, and microwave components.

3700 <u>Transportation Equipment</u>: This major group is part of the manufacturing division. It includes firms which produce equipment for transportation of passengers and cargo by land, air, and water.

3710 <u>Motor Vehicles and Motor Vehicle Equipment</u>: This industry is part of major group Transportation Equipment (SIC Code 3700), which in turn, is part of the Manufacturing division. It includes firms which produce passenger car, truck, and bus bodies, as well as most motor vehicle parts, such as axles, bumpers, radiators, and wheels.

3720-3790 <u>Other Transportation Vehicles</u>: Industries/industry groups which comprise all of major group transportation in equipment, with the exception of passengers for, truck, and bus manufactors. Prior to 1972, military transportation equipment was also excluded.

3720 <u>Aircraft and Parts</u>: This industry group is part of major group Transportation Equipment. It includes firms which undertake research and development of aircraft and produce and/or assemble aircraft, as well as their engines and other components.

3721 <u>Aircraft</u>: This industry is part of major group Transportation Equipment. It includes firms which produce and/or assemble complete aircraft, as well as those engaged in aircraft research and development.

3729 <u>Aircraft Equipment Not Elsewhere Classified</u>: This industry was reclassified in 1972 to Aircraft Parts and Auxiliary Equipment, Not Elsewhere Classified (SIC Code 3728). It remains a part of major group Transportation Equipment. It includes research and development on aircraft parts, as well as such products as aircraft body assemblies, fins, fuel tanks, gears, propellers, wheels, and wing assemblers.

3743 <u>Railroad Equipment</u>: This industry is part of major group Transportation Equipment. It includes firms which produce locomotives, railroad, street and rapid transit cars, and equipment for operating rail freight and passenger service.

3760	<u>Guided Missiles, Space Vehicles and Parts</u>: This industry group is part of major group Transportation Equipment. It includes firms which engages in research and development, and/or production of missile or space vehicle airframes, casings, engines, propulsion units, and complete missiles, rocket, and space vehicles.
3811	<u>Engineering and Scientific Equipment</u>: This industry is part of major group Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods, Watches and Clocks (SIC Code 3800) which in turn is part of the Manufacturing division. It includes firms which produce nautical, navigational, aeronautical, surveying, and drafting equipment, and instruments for laboratory research.
4800	<u>Communications</u>: This major group is part of the Transportation, Communication, and Public Utilities division. It includes firms which supply point-to-point communication services, such as telephone, radio, and television broadcasting.
5000	<u>Wholesale Trade-Durable Goods</u>: This division includes firms which sell durable goods to retail establishments, and to industrial, commercial, institutional, farm, and professional business users. Thus, wholesalers of autos, furniture, appliances, and construction materials would fall within this division.
5200-5900	<u>Retail Trade</u>: This division, comprised of 8 two-digit SIC Code major industry groups, includes firms which market goods and services for personal or household consumption. Hardware stores, as well as lumber, department, food, and clothing stores are examples of firms within Retail Trade.
6500-6600	<u>Real Estate and Combinations</u>: These two major groups form part of Finance, Insurance, and Real Estate division. It includes real estate operators, land developers, and businesses supplying combined insurance, loan, or legal services.
7300	<u>Miscellaneous Business Services</u>: This major group is part of the services include advertising, credit reporting, mailing, photofraphy, data processing, research and development, and consulting.
8100	<u>Legal Services</u>: This major group is part of the Services division. It includes firms which supply legal advice and services, for example, lawyers and legal aid services.

8900 Miscellaneous Services: This major group is part of the services division. It includes professional services not classified elsewhere. Engineers, architects, accountants, artists, lecturers, and writers, as well as non-commercial research, are examples.

F

ACRONYMS

F

ACRONYMS

AB	Allocated Baseline
ADBP	Air Deflector Blast Plug
AF	Air Force
AFR	Air Force Regulation
AFRPL	Air Force Rocket Propulsion Laboratory (Edwards AFB, California)
AFSC	Air Force Systems Command
AFTEC	Air Force Test and Evaluation Center
ALCC	Airborne Launch Control Center
AQCR	Air Quality Control Region
AT&SS	Assembly Test and Systems Support
AVE	Aerospace Vehicle Equipment
BEA	Bureau of Economic Analysis
BMCA	Basing Mode Comparison Area
BP	Blast Plug
CEQ	Council of Environmental Quality
CES	Candidate Environmental Statement

CY	Calendar Year
DB (dB)	Decibel
DCAS	Defense Contract Administration Services
DES	Draft Environmental Statement
DOD	Department of Defense
DOPAA	Description of Proposed Actions/Alternatives
DSARC	Defense System Acquisition Review Council
EBW	Exploding Bridge Wire
EM	Electromagnetic
EMP	Electromagnetic Pulse
EPA	Environmental Protection Agency
ERDA	Energy Research and Development Administration
FEIS	Formal Environmental Impact Statement
FSED	Full-Scale Engineering Development
FY	Fiscal Year
H&S	Hardness and Survivability
ICBM	Intercontinental Ballistic Missile
IR	Infrared
ISTRAD	First Strategic Aerospace Division
KGRA	Known Geothermal Resource Area
LA	Liquid Asphalt
LCF	Launch Control Facility
MAB	Missile Assembly Building
MBA	Missile Boost Assembly
MAP	Multiple Aimpoint

MGCS	Missile Guidance Control System
MIRV	Multiple Independently Targeted Reentry Vehicle
MLCC	Mobile Launch Control Center
MLCCT	Mobile Launch Control Center Transporter
MLV	Mobile Launch Vehicle
MLF	Missile Launch Facility
MLP	Missile Launch Platform
MT	Missile Transporter
NAAQS	National Ambient Air Quality Standards (40 CFR 50)
NEPA	National Environmental Protection Act
NH&S	Nuclear Hardness & Survivability
OCC	Operations Control Center
OGE	Operational Ground Equipment
OIS	Office of Information Security/Ordinance Initiation System
OSD	Office of Secretary of Defense
OSHA	Occupational Safety and Health Act
PAB	Pay Load Assembly Building
PBCS	Post-Boost Control System
PBPS	Post-Boost Propulsion System
PBV	Post-Boost Vehicle
PS	Trench Protective Structure
PSF	Primary Support Facility
RAD	Radiation

R&D	Research and Development
RFP	Request for Proposal
RIMS	Regional Industrial Multiplier System
RPL	Rocket Propulsion Laboratory
SA	Sand
SAC	Strategic Air Command
SAMSO	Space & Missile Systems Organization
SAMTEC	Space & Missile Test Center (VAFB)
SE	Support Equipment
SIC	Standard Industrial Classification
SLC	Vandenberg AFB Space Launch Complex
SMSA	Standard Metropolitan Statistical Area
SMSB	Strategic Missile Support Base
SPO	Systems Program Office
SRM	Site Ranking Methodology
SS	Support System
STE	System Test Equipment/Special Test Equipment
S&V (S/V)	Survivability & Vulnerability
TL	Transport Launcher
UHF	Ultra High Frequency
VAFB	Vandenberg Air Force Base
V&H	Vulnerability and Hardness
VHF	Very High Frequency
VT	Vehicle Transporter
WTR	Western Test Range

H

UNITS OF MEASUREMENT

H

UNITS OF MEASUREMENT

BTU	British Thermal Unit
fps	Feet per second
kHz	Kilo-hertz
kWh	Kilowatt hour
mph	Miles per hour
MW	Megawatt
nm	Nautical mile
ppm	Parts per million

I

GEOLOGICAL TIME SCALE

GEOLOGICAL TIME SCALE

MAJOR STRATIGRAPHIC AND TIME DIVISIONS

SUBDIVISIONS IN USE BY THE U.S. GEOLOGICAL SURVEY			AGE ESTIMATES COMMONLY USED FOR BOUNDARIES (IN MILLION YEARS)	
ERA OR ERATHEM	SYSTEM OR PERIOD	SERIES OR EPOCH	(A)	(B)
Cenozoic	Quaternary	Holocene		
		Pleistocene	1.5-2	1.8
	Tertiary	Pliocene	ca. 7	5.0
		Miocene	26	22.5
		Oligocene	37-38	37.5
		Eocene	53-54	53.4
		Paleocene	65	65
Mesozoic	Cretaceous	Upper (late) Lower (early)	136	
	Jurassic	Upper (late) Middle (middle) Lower (early)	190-195	
	Triassic	Upper (late) Middle (middle) Lower (early)	225	
Paleozoic	Permian	Upper (late) Lower (early)	280	
	Pennsylvanian	Upper (late) Middle (middle) Lower (early)	325	
	Mississippian	Upper (late) Lower (early)	345	
	Devonian	Upper (late) Middle (middle) Lower (early)	395	
	Silurian	Upper (late) Middle (middle) Lower (early)	430-440	
	Ordovician	Upper (late) Middle (middle) Lower (early)	490-500	
	Cambrian	Upper (late) Middle (middle) Lower (early)	570	

Time subdivisions of the Precambrian:

Precambrian	Precambrian Z - base of Cambrian to 800 m.y. Precambrian Y - 800 m.y. to 1,600 m.y. Precambrian X - 1,600 m.y. to 2,500 m.y. Precambrian W - older than 2,500 m.y.

The oldest rocks are about 3.3 billion years old. The age of the earth is 4 to 5 billion years.

Source: Geological Names Committee, U.S. Geological Survey, 1972.

G

METRIC SYSTEM

G

METRIC SYSTEM

METRIC SYSTEM

LENGTH

unit	abbreviation	number of meters	approximate U.S. equivalent
myriameter	mym	10,000	6.2 miles
kilometer	km	1,000	0.62 mile
hectometer	hm	100	109.36 yards
dekameter	dam	10	32.81 feet
meter	m	1	39.37 inches
decimeter	dm	0.1	3.94 inches
centimeter	cm	0.01	0.39 inch
millimeter	mm	0.001	0.04 inch

AREA

unit	abbreviation	number of square meters	approximate U.S. equivalent
square kilometer	sq km *or* km²	1,000,000	0.3861 square mile
hectare	ha	10,000	2.47 acres
are	a	100	119.60 square yards
centare	ca	1	10.76 square feet
square centimeter	sq cm *or* cm²	0.0001	0.155 square inch

VOLUME

unit	abbreviation	number of cubic meters	approximate U.S. equivalent
dekastere	das	10	13.10 cubic yards
stere	s	1	1.31 cubic yards
decistere	ds	0.10	3.53 cubic feet
cubic centimeter	cu cm *or* cm³ *also* cc	0.000001	0.061 cubic inch

CAPACITY

unit	abbreviation	number of liters	approximate U.S. equivalent		
			cubic	dry	liquid
kiloliter	kl	1,000	1.31 cubic yards		
hectoliter	hl	100	3.53 cubic feet	2.84 bushels	
dekaliter	dal	10	0.35 cubic foot	1.14 pecks	2.64 gallons
liter	l	1	61.02 cubic inches	0.908 quart	1.057 quarts
deciliter	dl	0.10	6.1 cubic inches	0.18 pint	0.21 pint
centiliter	cl	0.01	0.6 cubic inch		0.338 fluidounce
milliliter	ml	0.001	0.06 cubic inch		0.27 fluidram

MASS AND WEIGHT

unit	abbreviation	number of grams	approximate U.S. equivalent
metric ton	MT *or* t	1,000,000	1.1 tons
quintal	q	100,000	220.46 pounds
kilogram	kg	1,000	2.2046 pounds
hectogram	hg	100	3.527 ounces
dekagram	dag	10	0.353 ounce
gram	g *or* gm	1	0.035 ounce
decigram	dg	0.10	1.543 grains
centigram	cg	0.01	0.154 grain
milligram	mg	0.001	0.015 grain

ADDITIONAL UNITS OF MEASUREMENT

cfs – cubic feet per second
lb/acre – pounds per acre
maf – million acre feet
mg/l – milligrams per liter
kg/ha – kilograms per hectare

LENGTH

unit	abbreviation	number of meters	approximate U.S. equivalent
nautical mile	nmi	1,853.25 meters (US) 1,853.2 meters (Great Britain)	1 sea or air mile
statute mile	mi	1,609.35 meters	1 mile or 1,760 yards

372P-506-1

J

REGIONAL INDUSTRIAL MULTIPLIER SYSTEM

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REGIONAL INDUSTRIAL MULTIPLIER SYSTEM

INTRODUCTION

The total economic effect of a project is substantially greater than the direct cost of building and/or operations since the total includes secondary economic effects as well as the initial investment. The additional, or secondary, effect is estimated through a multiplier relationship: the ratio between the total increase in economic activity as a result of a project and the initial project investment. The initial effect, known as the final-demand change, represents the change introduced into the economy by the project itself. The secondary effect is the sum of the additional economic activity generated in the region by the initial effect. The analyses are particularly important since economic stimulation and new jobs created are often the key benefits of a construction or operations project, while lost jobs are a major source of controversey when an ongoing project must be terminated.

During manufacture of an MX subsystem, for example, the initial economic effect is represented by expenditures for equipment and materials purchased from local manufacturers and distributors, and for labor. The local direct suppliers in turn purchase goods and services from other, secondary suppliers (for example, wholesalers). The secondary suppliers in turn rely on other suppliers further removed from the project. These successive rounds of interindustry purchases and sales are the secondary economic effects of the project.

The size of the regional multiplier depends on the proporation of direct and indirect input requirements that can be supplied by the region's economy, which in turn depends on both the specific needs of the project and the ability of the regional economy to supply the inputs. Conceptually, therefore, there is a different multiplier for every specific combination of industry and site in the nation.

ALTERNATIVE METHODOLOGIES

Economists have developed several alternative means for estimating the total economic effect, given the initial effect. The three main approaches are the economic base model, the econometric model, and the input/output (or I/O) model.

The economic base model provides the simplest approach to estimating total economic effect. This model divides the regional economy into two sectors, one producing goods and services for export to other regions (called the export, or basic, sector), and one producing goods and services for local consumption (called the residentiary, or nonbasic, sector). The income earned (or employment) in each sector is estimated and the economic base multiplier is defined as the ratio of total income (employment) to export sector income (employment). The impact analysis requires identifying the initial change in the export sector. The product of this initial change and the multiplier is the total change in income (employment).

In the econometric model, the economy is represented by a set of interrelated equations describing the interactions among economic components. Time series data are assembled for the variables of the model, and regression analysis is used to estimate the coefficients of the equations. The economic impact analysis usually involves introducing the initial change in the appropriate equation of the model and recalculating the other equations to obtain the total impact.

The I/O model describes the flows of goods and services to markets and between industries in a region. Each industry in the economy has a particular set of inputs required to produce its output, requirements that generally differ from those of other industries. The I/O model describes the structure of the economy and may be used to analyze the implications of the changes in one portion of the economic system on levels of activity in other portions of the system. It summarizes the many rounds of economic effects that are set off by the final-demand change. Implicit in this process is a multiplier that relates the total change to a specific initial change.

Each approach has advantages and disadvantages. The economic base model is simple to apply, but it fails to provide results tailored to the specific project being analyzed. Equal initial changes, whether in agriculture or energy supply, will produce equal total changes. The econometric model offers results that are moderately sensitive to differences in the nature of the project, but the data requirements (a long time series for all variables) and the time required to assemble and estimate the model generally rule out its use, particularly for areas smaller than a state. The I/O model generally provides more useful industrial detail than the other two. However, while it does not require time series data, an I/O model is usually costly to construct,

and application involving regions smaller than a state are difficult, and again because of data limitations.

RIMS MULTIPLIER

HDR-Ecosciences uses a variation of the I/O approach, known as the Regional Industrial Multiplier System (RIMS).* This system was developed to overcome the cost and/or small-area data limitations associated with traditional approaches, and to provide both geographic and industrial flexibility. It is a system of interrelated data files and computer programs designed to estimate I/O type regional multipliers for any of the 484 industries specified in the Bureau of Economic Analysis (BEA) national I/O model, and for any region that can be defined as one or more counties in the United States.

The system combines several advantages of the economic base and I/O approaches to regional impact analysis to produce regional multipliers that are conceptually similar to I/O multipliers. RIMS relies on secondary data sources; is sensitive to differences between industries; operates at a detailed industrial level; and is relatively inexpensive to apply. Furthermore, RIMS allows disaggregation of the resulting impacts for analysis of the industrial composition of the total regional economic change.

The regional multiplier estimates the portion of succeeding waves of expenditures that occur within a defined region, thus providing a measure of the increased economic activity within the region. RIMS estimates project-specific multipliers needed to estimate changes in regional gross output, regional employment, and regional earnings by first computing the study industry's dependence on other regional industries. The relationship is used to estimate the multiplier effect of an increase in final demand in a given industry on the regional gross output. Earnings-to-gross-output ratios are then available to translate the output increase into increases in earnings. For any given region, the ratio of employment-to-earnings is also known, which permits an estimate of the total increased employment within the region.

Each industry requires inputs that are converted to an output, which serves as input to other industries. For example, the manufacture of electric motors requires, as some of its inputs, copper, electricity, labor, and transportation. When the electric motors are completed (are

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*The RIMS system was developed in the Regional Economic Analysis Division of the Bureau of Economic Analysis, U.S. Department of Commerce by a current employee of HDR-Ecosciences. The HDR version of RIMS has been refined by staff to meet client and government requirements.

an output) they are purchased by (become inputs to) the copper industry, the electric appliance industry, and others. Some of these suppliers and some of the consumers are located in the region of interest, while others are not. An I/O model ordinarily requires the development of an entire I/O matrix to account for this interdependence. While retaining many of the analytical opportunities of the I/O framework, RIMS avoids the need for this costly process by viewing the gross-output multiplier as comprising four elements: the initial change, the direct effect, the indirect effect, and the induced effect.

The initial change component in the multiplier represents project expenditures that will occur in the study region. Since this initial change is exactly equal to project expenditures, it is always represented in the multiplier by unity (1.000). The remaining components, the secondary economic effects, are added to the initial economic effect to provide the total economic effect.

The direct effect component accounts for both the industry input requirements and the ability of the area to meet them. The former is obtained from the national I/O model; the latter is derived from data relating to the study region (U.S. Bureau of the Census, County Business Patterns Program). Inputs required by the study industry but not produced in the region (or produced in insufficient quantity) must be imported by the region, thus reducing the direct effect component of the regional multiplier.

The input requirements, essentially for each 4-digit SIC* industry, are identified in the BEA national I/O model. The first step in regionalization is the evaluation of this set of requirements in light of what is known about the project or specific industry. The suitability of the national model industry for the project analysis is assessed and project-specific adjustments made in the national model input requirements on the basis of available project descriptions or engineering information.

The input requirements that result from this first step represent the technical requirements of the industry. The second step in regionalization reconciles the technical requirements of the industry with the capacity of the region to supply the required inputs. The technical requirements are replaced by regional direct coefficients reflecting the

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*Standard Industrial Classification is a taxonomy for grouping industries based on similarities. The digits are significant in that each industry identified NNXX is part of a larger set identified as NN. The specific industry used in RIMS is identified at the 4-digit level while the supplier industries are grouped to the 2-digit level.

actual purchases of inputs from suppliers within the study region. This step is accomplished with the use of the location quotient, which is a double ration of the form:

$$\frac{\text{industry}_i \text{ employment in study region/total employment in study region.}}{\text{industry}_i \text{ employment in the nation/total employment in the nation}}$$

County Business Patterns data are used to estimate these location quotients. If the location quotient for a given input is zero, no production is carried on in the region. Thus, all the required input must be imported and the regional direct effect is zero. If the location quotient is equal to or greater than one, production in the region is assumed to be sufficient to supply the study industry, and the regional direct effect is equal to the national direct requirement. In cases where the location quotient is greater than zero but less than one, the region is assumed to supply some of the input requirement, the proportion being equal to the value of the location quotient.

The location quotient test is applied to each regional industry that potentially supplies inputs to the study industry. The sum of all the resulting regionalized coefficients is the direct component of the regional multiplier.

The <u>indirect component</u> and the <u>induced component</u> are computed as a single combined value in RIMS. The indirect-induced effects are those resulting from expansion of supplier and service industries to meet the needs of the directly affected industry, as well as changes in local consumption expenditures. The indirect interactions measure additional rounds of expenditures and production that result from the initial stimulus. Local consumer's incomes are increased by direct and indirect effects, and some part of the income increases will be spent in the region, stimulating additional economic activity. This effect of increased incomes to local consumers is the induced effect, and is an extension of the indirect component. Estimation of the indirect-induced component is possible through the finding that in an I/O model, under empirically common conditions, the indirect-induced component can be estimated as a linear homogeneous function of the direct component [24, 25]. A sample of 17 I/O models containing 500 observations was used to develop the relationship.

To make the utility of RIMS comparable to I/O multipliers developed in the more costly traditional way, the RIMS procedure also includes disaggregation of the multiplier. This makes it possible to allocate the total increase in regional gross output, earnings, and employment to the specific industries of the regional economy.

OUTPUT

Tables J-1 through J-7 reproduce the RIMS output used in this report. The industry under study is represented in the RIMS system as " "1925-Complete Guided Missiles". The first two columns on the output identify the 2-digit SIC group that might supply goods or services to the missile industry. The remaining three columns provide the specific data, by industry, used to compute the gross output multiplier. Within California (Table J-1), the missile industry does not directly affect the Farm Industry (i.e. the direct component is 0.0) but does have a small indirect-induced effect. This is measured as 0.0031 meaning that for every million dollars of Air Force investment on MX in California, the farm industry should realize $3,100 of increased business ($1,000,000 x 0.0031). The three components of the multiplier (the initial, direct, and indirect-induced) are then summed to estimate the total gross output multiplier.

Table J-1. Regional Industrial Multiplier System, California.

1925 – COMPLETE GUIDED MISSILES

SIC	INDUSTRY NAME	ELEMENTS OF: DIRECT COMPONENT	ELEMENTS OF: INDIRECT-INDUCED COMPONENT	TOTAL MULTIPLIER
01	FARMS	0.0000	0.0031	0.0031
07	AGRICULTURAL SERVICES	0.0000	0.0008	0.0008
08+09	FORESTRY AND FISHERIES	0.0000	0.0026	0.0026
10	METAL MINING	0.0000	0.0000	0.0000
11	COAL MINING	0.0000	0.0000	0.0000
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	0.0151	0.0151
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	0.0005	0.0005
15-17	CONTRACT CONSTRUCTION	0.0019	0.0139	0.0158
19	FABRICATED METAL PRODUCTS	0.0295	0.0124	1.0419
20	FOOD AND KINDRED PRODUCTS	0.0000	0.1457	0.1457
21	TOBACCO MANUFACTURES	0.0000	0.0000	0.0000
22	TEXTILE MILL PRODUCTS	0.0000	0.0077	0.0077
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	0.0004	0.0420	0.0424
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	0.0000	0.0041	0.0041
25	FURNITURE AND FIXTURES	0.0000	0.0094	0.0094
26	PAPER AND ALLIED PRODUCTS	0.0004	0.0176	0.0190
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	0.0002	0.0177	0.0179
28	CHEMICALS AND ALLIED PRODUCTS	0.0011	0.0299	0.0310
29	PETROLEUM AND RELATED INDUSTRIES	0.0017	0.0343	0.0360
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	0.0092	0.0209	0.0301
31	LEATHER AND LEATHER PRODUCTS	0.0000	0.0054	0.0054
32	STONE, CLAY AND GLASS PRODUCTS	0.0005	0.0098	0.0103
33	PRIMARY METALS INDUSTRIES	0.0051	0.0278	0.0329
34	FABRICATED METALS PRODUCTS	0.0052	0.0407	0.0459
35	MACHINERY EXCEPT ELECTRICAL	0.0073	0.0238	0.0311
36	ELECTRICAL MACHINERY	0.0472	0.0550	0.1022
371	MOTOR VEHICLES	0.0000	0.0154	0.0154
372-379	OTHER TRANSPORTATION VEHICLES	0.1985	0.0503	0.2488
38	INSTRUMENTS	0.0065	0.0142	0.0207
39	MISCELLANEOUS MANUFACTURING	0.0000	0.0128	0.0128
40	RAILROAD TRANSPORTATION	0.0002	0.0042	0.0044
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	0.0041	0.0041
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	0.0012	0.0163	0.0175
44	WATER TRANSPORTATION	0.0000	0.0030	0.0030
45	AIR TRANSPORTATION	0.0002	0.0065	0.0068
46	PIPELINE TRANSPORTATION	0.0000	0.0003	0.0003
47	TRANSPORTATION SERVICES, INCL CARRIER AFFILIATES	0.0000	0.0009	0.0009
48	COMMUNICATIONS	0.0142	0.0305	0.0447
49	PUBLIC UTILITIES	0.0024	0.0284	0.0308
50	WHOLESALE TRADE	0.0075	0.0911	0.0987
52-59	RETAIL TRADE	0.0172	0.1897	0.2059
60	BANKING	0.0015	0.0229	0.0244
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	0.0049	0.0049
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	0.0007	0.0090	0.0097
63	INSURANCE CARRIERS, INCL SOLICITORS	0.0016	0.0303	0.0319
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	0.0100	0.0100
65+66	REAL ESTATE AND COMBINATIONS	0.0073	0.1046	0.1119
70	LODGING PLACES	0.0000	0.0028	0.0028
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	0.0024	0.0275	0.0299
73	MISCELLANEOUS BUSINESS SERVICES	0.0328	0.0526	0.0854
75	AUTO REPAIR AND SERVICES	0.0025	0.0256	0.0281
78	MOTION PICTURES	0.0000	0.0107	0.0107
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	0.0129	0.0129
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	0.0456	0.0456
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	0.0065	0.0236	0.0301
82	PRIVATE EDUCATIONAL SERVICES	0.0000	0.0050	0.0050
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	0.0020	0.0442	0.0462
	HOUSEHOLDS	0.4536	0.6607	1.1142
TOTAL		0.8686	2.0990	3.9675

MULTIPLIER - COMPONENTS

INITIAL	1.000
DIRECT	0.869
INDIRECT-INDUCED	2.099
GROSS OUTPUT MULTIPLIER	3.968

372T-A001

Table J-2. Regional Industrial Multiplier System, Colorado.

1925 – COMPLETE GUIDED MISSILES

SIC	INDUSTRY NAME	ELEMENTS OF DIRECT COMPONENT	ELEMENTS OF INDIRECT-INDUCED COMPONENT	TOTAL MULTIPLIER
01	FARMS	0.0000	0.0061	0.0061
07	AGRICULTURAL SERVICES	0.0000	0.0007	0.0007
08+09	FORESTRY AND FISHERIES	0.0000	0.0000	0.0000
10	METAL MINING	0.0000	0.0002	0.0002
11	COAL MINING	0.0000	0.0002	0.0002
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	0.0044	0.0044
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	0.0006	0.0006
15-17	CONTRACT CONSTRUCTION	0.0023	0.0128	0.0151
19	FABRICATED METAL PRODUCTS	0.0295	0.0095	1.0390
20	FOOD AND KINDRED PRODUCTS	0.0000	0.1177	0.1177
21	TOBACCO MANUFACTURES	0.0000	0.0000	0.0000
22	TEXTILE MILL PRODUCTS	0.0000	0.0002	0.0002
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	0.0001	0.0078	0.0079
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	0.0000	0.0009	0.0009
25	FURNITURE AND FIXTURES	0.0000	0.0027	0.0027
26	PAPER AND ALLIED PRODUCTS	0.0001	0.0029	0.0030
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	0.0002	0.0105	0.0107
28	CHEMICALS AND ALLIED PRODUCTS	0.0011	0.0128	0.0139
29	PETROLEUM AND RELATED INDUSTRIES	0.0005	0.0071	0.0076
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	0.0092	0.0123	0.0215
31	LEATHER AND LEATHER PRODUCTS	0.0001	0.0053	0.0054
32	STONE, CLAY AND GLASS PRODUCTS	0.0000	0.0031	0.0031
33	PRIMARY METALS INDUSTRIES	0.0015	0.0031	0.0046
34	FABRICATED METALS PRODUCTS	0.0039	0.0180	0.0219
35	MACHINERY EXCEPT ELECTRICAL	0.0065	0.0094	0.0159
36	ELECTRICAL MACHINERY	0.0236	0.0130	0.0366
371	MOTOR VEHICLES	0.0000	0.0032	0.0032
372-379	OTHER TRANSPORTATION VEHICLES	0.0732	0.0070	0.0802
38	INSTRUMENTS	0.0054	0.0061	0.0115
39	MISCELLANEOUS MANUFACTURING	0.0000	0.0065	0.0065
40	RAILROAD TRANSPORTATION	0.0005	0.0071	0.0076
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	0.0028	0.0028
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	0.0014	0.0135	0.0149
44	WATER TRANSPORTATION	0.0000	0.0000	0.0000
45	AIR TRANSPORTATION	0.0002	0.0038	0.0040
46	PIPELINE TRANSPORTATION	0.0000	0.0006	0.0006
47	TRANSPORTATION SERVICES, INCL CARRIER AFFILIATES	0.0000	0.0005	0.0005
48	COMMUNICATIONS	0.0142	0.0202	0.0344
49	PUBLIC UTILITIES	0.0039	0.0347	0.0386
50	WHOLESALE TRADE	0.0076	0.0616	0.0692
52-59	RETAIL TRADE	0.0172	0.1389	0.1561
60	BANKING	0.0014	0.0140	0.0154
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	0.0031	0.0031
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	0.0007	0.0045	0.0052
63	INSURANCE CARRIERS, INCL SOLICITORS	0.0016	0.0229	0.0245
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	0.0076	0.0076
65+66	REAL ESTATE AND COMBINATIONS	0.0073	0.0717	0.0790
70	LODGING PLACES	0.0000	0.0029	0.0029
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	0.0024	0.0193	0.0217
73	MISCELLANEOUS BUSINESS SERVICES	0.0328	0.0336	0.0664
75	AUTO REPAIR AND SERVICES	0.0025	0.0190	0.0215
78	MOTION PICTURES	0.0000	0.0015	0.0015
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	0.0069	0.0069
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	0.0341	0.0341
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	0.0065	0.0133	0.0198
82	PRIVATE EDUCATIONAL SERVICES	0.0000	0.0038	0.0038
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	0.0021	0.0321	0.0342
	HOUSEHOLDS	0.4535	0.4103	0.8638
TOTAL		0.7130	1.2690	2.9818

MULTIPLIER - COMPONENTS

INITIAL	1.000
DIRECT	0.713
INDIRECT-INDUCED	1.269
GROSS OUTPUT MULTIPLIER	2.982

372T-A002

Table J-3. Regional Industrial Multiplier System, Washington.

SIC	INDUSTRY NAME	1925 – COMPLETE GUIDED MISSILES ELEMENTS OF DIRECT COMPONENT	INDIRECT-INDUCED COMPONENT	TOTAL MULTIPLIER
01	FARMS	0.0000	0.0042	0.0042
07	AGRICULTURAL SERVICES	0.0000	0.0011	0.0011
08+09	FORESTRY AND FISHERIES	0.0000	0.0096	0.0096
10	METAL MINING	0.0000	0.0000	0.0000
11	COAL MINING	0.0000	0.0000	0.0000
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	0.0000	0.0000
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	0.0002	0.0002
15-17	CONTRACT CONSTRUCTION	0.0023	0.0114	0.0137
19	FABRICATED METAL PRODUCTS	0.0000	0.0000	1.0000
20	FOOD AND KINDRED PRODUCTS	0.0000	0.1158	0.1158
21	TOBACCO MANUFACTURES	0.0000	0.0000	0.0000
22	TEXTILE MILL PRODUCTS	0.0000	0.0000	0.0000
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	0.0002	0.0142	0.0144
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	0.0000	0.0102	0.0102
25	FURNITURE AND FIXTURES	0.0000	0.0030	0.0030
26	PAPER AND ALLIED PRODUCTS	0.0005	0.0140	0.0145
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	0.0002	0.0090	0.0092
28	CHEMICALS AND ALLIED PRODUCTS	0.0002	0.0028	0.0030
29	PETROLEUM AND RELATED INDUSTRIES	0.0001	0.0021	0.0022
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	0.0019	0.0015	0.0034
31	LEATHER AND LEATHER PRODUCTS	0.0000	0.0006	0.0006
32	STONE, CLAY AND GLASS PRODUCTS	0.0005	0.0050	0.0055
33	PRIMARY METALS INDUSTRIES	0.0037	0.0115	0.0152
34	FABRICATED METALS PRODUCTS	0.0035	0.0170	0.0205
35	MACHINERY EXCEPT ELECTRICAL	0.0035	0.0074	0.0109
36	ELECTRICAL MACHINERY	0.0175	0.0096	0.0271
371	MOTOR VEHICLES	0.0000	0.0055	0.0055
372-379	OTHER TRANSPORTATION VEHICLES	0.1985	0.0368	0.2353
38	INSTRUMENTS	0.0014	0.0021	0.0035
39	MISCELLANEOUS MANUFACTURING	0.0000	0.0033	0.0033
40	RAILROAD TRANSPORTATION	0.0000	0.0000	0.0000
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	0.0030	0.0030
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	0.0014	0.0158	0.0172
44	WATER TRANSPORTATION	0.0000	0.0032	0.0032
45	AIR TRANSPORTATION	0.0002	0.0045	0.0047
46	PIPELINE TRANSPORTATION	0.0000	0.0002	0.0002
47	TRANSPORTATION SERVICES, INCL CARRIER AFFILIATES	0.0000	0.0007	0.0007
48	COMMUNICATIONS	0.0142	0.0236	0.0378
49	PUBLIC UTILITIES	0.0016	0.0153	0.0169
50	WHOLESALE TRADE	0.0076	0.0749	0.0825
52-59	RETAIL TRADE	0.0172	0.1671	0.1843
60	BANKING	0.0016	0.0166	0.0182
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	0.0034	0.0034
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	0.0007	0.0044	0.0051
63	INSURANCE CARRIERS, INCL SOLICITORS	0.0016	0.0259	0.0275
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	0.0086	0.0086
65+66	REAL ESTATE AND COMBINATIONS	0.0073	0.0810	0.0883
70	LODGING PLACES	0.0000	0.0032	0.0032
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	0.0024	0.0226	0.0250
73	MISCELLANEOUS BUSINESS SERVICES	0.0296	0.0312	0.0608
75	AUTO REPAIR AND SERVICES	0.0025	0.0231	0.0256
78	MOTION PICTURES	0.0000	0.0034	0.0034
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	0.0086	0.0086
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	0.0409	0.0409
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	0.0065	0.0177	0.0242
82	PRIVATE EDUCATIONAL SERVICES	0.0000	0.0018	0.0018
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	0.0021	0.0155	0.0176
	HOUSEHOLDS	0.4535	0.4541	0.9076
TOTAL		0.7840	1.3680	3.1520

MULTIPLIER - COMPONENTS

INITIAL	1.000
DIRECT	0.784
INDIRECT-INDUCED	1.368
GROSS OUTPUT MULTIPLIER	3.152

Table J-4. Regional Industrial Multiplier System, New York/New Jersey/Connecticut.

1925 – COMPLETE GUIDED MISSILES

SIC	INDUSTRY NAME	ELEMENTS OF: DIRECT COMPONENT	ELEMENTS OF: INDIRECT-INDUCED COMPONENT	ELEMENTS OF: TOTAL MULTIPLIER
01	FARMS	0.0000	0.0003	0.0003
07	AGRICULTURAL SERVICES	0.0000	0.0005	0.0005
08+09	FORESTRY AND FISHERIES	0.0000	0.0004	0.0004
10	METAL MINING	0.0000	0.0001	0.0001
11	COAL MINING	0.0000	0.0000	0.0000
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	0.0016	0.0016
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	0.0004	0.0004
15-17	CONTRACT CONSTRUCTION	0.0016	0.0133	0.0149
19	FABRICATED METAL PRODUCTS	0.0126	0.0037	1.0163
20	FOOD AND KINDRED PRODUCTS	0.0000	0.1513	0.1513
21	TOBACCO MANUFACTURES	0.0000	0.0083	0.0083
22	TEXTILE MILL PRODUCTS	0.0000	0.0385	0.0385
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	0.0004	0.0484	0.0488
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	0.0000	0.0008	0.0008
25	FURNITURE AND FIXTURES	0.0000	0.0065	0.0065
26	PAPER AND ALLIED PRODUCTS	0.0005	0.0278	0.0283
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	0.0002	0.0239	0.0241
28	CHEMICALS AND ALLIED PRODUCTS	0.0019	0.0596	0.0615
29	PETROLEUM AND RELATED INDUSTRIES	0.0015	0.0303	0.0318
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	0.0067	0.0136	0.0203
31	LEATHER AND LEATHER PRODUCTS	0.0001	0.0099	0.0100
32	STONE, CLAY AND GLASS PRODUCTS	0.0002	0.0040	0.0042
33	PRIMARY METALS INDUSTRIES	0.0046	0.0216	0.0262
34	FABRICATED METALS PRODUCTS	0.0042	0.0274	0.0316
35	MACHINERY EXCEPT ELECTRICAL	0.0111	0.0188	0.0299
36	ELECTRICAL MACHINERY	0.0459	0.0526	0.0985
371	MOTOR VEHICLES	0.0000	0.0046	0.0046
372-379	OTHER TRANSPORTATION VEHICLES	0.1449	0.0278	0.1727
38	INSTRUMENTS	0.0065	0.0131	0.0196
39	MISCELLANEOUS MANUFACTURING	0.0003	0.0111	0.0114
40	RAILROAD TRANSPORTATION	0.0000	0.0065	0.0065
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	0.0105	0.0105
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	0.0012	0.0170	0.0182
44	WATER TRANSPORTATION	0.0000	0.0042	0.0042
45	AIR TRANSPORTATION	0.0002	0.0063	0.0065
46	PIPELINE TRANSPORTATION	0.0000	0.0001	0.0001
47	TRANSPORTATION SERVICES, INCL CARRIER AFFILIATES	0.0000	0.0011	0.0011
48	COMMUNICATIONS	0.0142	0.0332	0.0474
49	PUBLIC UTILITIES	0.0036	0.0563	0.0599
50	WHOLESALE TRADE	0.0076	0.0919	0.0995
52-59	RETAIL TRADE	0.0149	0.1688	0.1837
60	BANKING	0.0016	0.0296	0.0312
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	0.0067	0.0067
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	0.0007	0.0257	0.0264
63	INSURANCE CARRIERS, INCL SOLICITORS	0.0016	0.0333	0.0349
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	0.0110	0.0110
65+66	REAL ESTATE AND COMBINATIONS	0.0073	0.1138	0.1211
70	LODGING PLACES	0.0000	0.0052	0.0052
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	0.0025	0.0297	0.0322
73	MISCELLANEOUS BUSINESS SERVICES	0.0328	0.0574	0.0902
75	AUTO REPAIR AND SERVICES	0.0024	0.0218	0.0242
78	MOTION PICTURES	0.0000	0.0070	0.0070
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	0.0132	0.0132
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	0.0445	0.0445
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	0.0065	0.0339	0.0404
82	PRIVATE EDUCATIONAL SERVICES	0.0000	0.0200	0.0200
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	0.0021	0.0323	0.0344
	HOUSEHOLDS	0.4535	0.6749	1.1284
TOTAL		0.7959	2.1760	3.9719

MULTIPLIER - COMPONENTS

INITIAL	1.000
DIRECT	0.796
INDIRECT-INDUCED	2.176
GROSS OUTPUT MULTIPLIER	3.972

372T-A004

Table J-5. Regional Industrial Multiplier System, Massachusetts.

1925 – COMPLETE GUIDED MISSILES

SIC	INDUSTRY NAME	ELEMENTS OF DIRECT COMPONENT	ELEMENTS OF INDIRECT-INDUCED COMPONENT	TOTAL MULTIPLIER
01	FARMS	0.0000	0.0010	0.0010
07	AGRICULTURAL SERVICES	0.0000	0.0007	0.0007
08+09	FORESTRY AND FISHERIES	0.0000	0.0068	0.0068
10	METAL MINING	0.0000	0.0000	0.0000
11	COAL MINING	0.0000	0.0000	0.0000
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	0.0000	0.0000
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	0.0001	0.0001
15-17	CONTRACT CONSTRUCTION	0.0021	0.0135	0.0156
19	FABRICATED METAL PRODUCTS	0.0295	0.0106	1.0401
20	FOOD AND KINDRED PRODUCTS	0.0000	0.1184	0.1184
21	TOBACCO MANUFACTURES	0.0000	0.0000	0.0000
22	TEXTILE MILL PRODUCTS	0.0000	0.0194	0.0194
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	0.0003	0.0327	0.0330
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	0.0000	0.0010	0.0010
25	FURNITURE AND FIXTURES	0.0000	0.0043	0.0043
26	PAPER AND ALLIED PRODUCTS	0.0006	0.0263	0.0269
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	0.0002	0.0158	0.0160
28	CHEMICALS AND ALLIED PRODUCTS	0.0010	0.0223	0.0233
29	PETROLEUM AND RELATED INDUSTRIES	0.0003	0.0047	0.0050
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	0.0090	0.0124	0.0214
31	LEATHER AND LEATHER PRODUCTS	0.0001	0.0091	0.0092
32	STONE, CLAY AND GLASS PRODUCTS	0.0002	0.0019	0.0021
33	PRIMARY METALS INDUSTRIES	0.0026	0.0090	0.0116
34	FABRICATED METALS PRODUCTS	0.0046	0.0263	0.0309
35	MACHINERY EXCEPT ELECTRICAL	0.0076	0.0246	0.0322
36	ELECTRICAL MACHINERY	0.0473	0.0418	0.0891
371	MOTOR VEHICLES	0.0000	0.0038	0.0038
372-379	OTHER TRANSPORTATION VEHICLES	0.1574	0.0234	0.1808
38	INSTRUMENTS	0.0065	0.0102	0.0167
39	MISCELLANEOUS MANUFACTURING	0.0000	0.0063	0.0063
40	RAILROAD TRANSPORTATION	0.0000	0.0000	0.0000
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	0.0086	0.0086
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	0.0012	0.0137	0.0149
44	WATER TRANSPORTATION	0.0000	0.0010	0.0010
45	AIR TRANSPORTATION	0.0002	0.0052	0.0054
46	PIPELINE TRANSPORTATION	0.0000	0.0000	0.0000
47	TRANSPORTATION SERVICES, INCL CARRIER AFFILIATES	0.0000	0.0007	0.0007
48	COMMUNICATIONS	0.0142	0.0271	0.0413
49	PUBLIC UTILITIES	0.0033	0.0434	0.0467
50	WHOLESALE TRADE	0.0076	0.0790	0.0866
52-59	RETAIL TRADE	0.0172	0.1666	0.1838
60	BANKING	0.0016	0.0191	0.0207
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	0.0023	0.0023
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	0.0007	0.0079	0.0086
63	INSURANCE CARRIERS, INCL SOLICITORS	0.0016	0.0272	0.0288
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	0.0090	0.0090
65+66	REAL ESTATE AND COMBINATIONS	0.0069	0.0883	0.0952
70	LODGING PLACES	0.0000	0.0034	0.0034
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	0.0024	0.0245	0.0269
73	MISCELLANEOUS BUSINESS SERVICES	0.0328	0.0423	0.0751
75	AUTO REPAIR AND SERVICES	0.0025	0.0191	0.0216
78	MOTION PICTURES	0.0000	0.0029	0.0029
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	0.0078	0.0078
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	0.0371	0.0371
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	0.0065	0.0222	0.0287
82	PRIVATE EDUCATIONAL SERVICES	0.0000	0.0327	0.0327
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	0.0021	0.0135	0.0156
	HOUSEHOLDS	0.4535	0.5622	1.0157
TOTAL		0.8236	1.7130	3.5366

MULTIPLIER - COMPONENTS

INITIAL	1.000
DIRECT	0.824
INDIRECT-INDUCED	1.713
GROSS OUTPUT MULTIPLIER	3.537

372T-A005

Table J-6. Regional Industrial Multiplier System, Utah.

1925 – COMPLETE GUIDED MISSILES

SIC	INDUSTRY NAME	ELEMENTS OF: DIRECT COMPONENT	ELEMENTS OF: INDIRECT-INDUCED COMPONENT	TOTAL MULTIPLIER
01	FARMS	0.0000	0.0086	0.0086
07	AGRICULTURAL SERVICES	0.0000	0.0007	0.0007
08+09	FORESTRY AND FISHERIES	0.0000	0.0000	0.0000
10	METAL MINING	0.0000	0.0085	0.0085
11	COAL MINING	0.0000	0.0001	0.0001
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	0.0034	0.0034
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	0.0004	0.0004
15-17	CONTRACT CONSTRUCTION	0.0023	0.0102	0.0125
19	FABRICATED METAL PRODUCTS	0.0295	0.0094	1.0389
20	FOOD AND KINDRED PRODUCTS	0.0000	0.0734	0.0734
21	TOBACCO MANUFACTURES	0.0000	0.0000	0.0000
22	TEXTILE MILL PRODUCTS	0.0000	0.0001	0.0001
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	0.0002	0.0136	0.0138
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	0.0000	0.0027	0.0027
25	FURNITURE AND FIXTURES	0.0000	0.0042	0.0042
26	PAPER AND ALLIED PRODUCTS	0.0000	0.0010	0.0010
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	0.0002	0.0070	0.0072
28	CHEMICALS AND ALLIED PRODUCTS	0.0006	0.0067	0.0073
29	PETROLEUM AND RELATED INDUSTRIES	0.0017	0.0236	0.0253
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	0.0021	0.0012	0.0033
31	LEATHER AND LEATHER PRODUCTS	0.0000	0.0000	0.0000
32	STONE, CLAY AND GLASS PRODUCTS	0.0000	0.0026	0.0026
33	PRIMARY METALS INDUSTRIES	0.0019	0.0205	0.0224
34	FABRICATED METALS PRODUCTS	0.0037	0.0127	0.0164
35	MACHINERY EXCEPT ELECTRICAL	0.0065	0.0087	0.0152
36	ELECTRICAL MACHINERY	0.0169	0.0063	0.0232
371	MOTOR VEHICLES	0.0000	0.0041	0.0041
372-379	OTHER TRANSPORTATION VEHICLES	0.1136	0.0237	0.1373
38	INSTRUMENTS	0.0042	0.0048	0.0090
39	MISCELLANEOUS MANUFACTURING	0.0000	0.0036	0.0036
40	RAILROAD TRANSPORTATION	0.0000	0.0000	0.0000
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	0.0027	0.0027
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	0.0014	0.0116	0.0130
44	WATER TRANSPORTATION	0.0000	0.0000	0.0000
45	AIR TRANSPORTATION	0.0001	0.0026	0.0027
46	PIPELINE TRANSPORTATION	0.0000	0.0011	0.0011
47	TRANSPORTATION SERVICES, INCL CARRIER AFFILIATES	0.0000	0.0003	0.0003
48	COMMUNICATIONS	0.0142	0.0185	0.0327
49	PUBLIC UTILITIES	0.0039	0.0347	0.0386
50	WHOLESALE TRADE	0.0076	0.0568	0.0644
52-59	RETAIL TRADE	0.0172	0.1296	0.1468
60	BANKING	0.0015	0.0137	0.0152
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	0.0029	0.0029
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	0.0006	0.0030	0.0036
63	INSURANCE CARRIERS, INCL SOLICITORS	0.0013	0.0169	0.0182
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	0.0052	0.0052
65+66	REAL ESTATE AND COMBINATIONS	0.0073	0.0620	0.0693
70	LODGING PLACES	0.0000	0.0024	0.0024
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	0.0024	0.0176	0.0200
73	MISCELLANEOUS BUSINESS SERVICES	0.0249	0.0214	0.0463
75	AUTO REPAIR AND SERVICES	0.0025	0.0175	0.0200
78	MOTION PICTURES	0.0000	0.0022	0.0022
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	0.0058	0.0058
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	0.0281	0.0281
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	0.0065	0.0130	0.0195
82	PRIVATE EDUCATIONAL SERVICES	0.0000	0.0023	0.0023
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	0.0021	0.0115	0.0136
	HOUSEHOLDS	0.4535	0.3643	0.8178
TOTAL		0.7304	1.1100	2.8404

MULTIPLIER - COMPONENTS	
INITIAL	1.000
DIRECT	0.730
INDIRECT-INDUCED	1.110
GROSS OUTPUT MULTIPLIER	2.840

372T-A006

Table J-7. Regional Industrial Multiplier System, Texas.

1925 – COMPLETE GUIDED MISSILES

SIC	INDUSTRY NAME	ELEMENTS OF DIRECT COMPONENT	INDIRECT-INDUCED COMPONENT	TOTAL MULTIPLIER
01	FARMS	0.0000	0.0008	0.0008
07	AGRICULTURAL SERVICES	0.0000	0.0005	0.0005
08+09	FORESTRY AND FISHERIES	0.0000	0.0000	0.0000
10	METAL MINING	0.0000	0.0000	0.0000
11	COAL MINING	0.0000	0.0000	0.0000
13	CRUDE PETROLEUM AND NATURAL GAS	0.0000	0.0135	0.0135
14	NONMETALLIC MINERAL MINING AND QUARRYING	0.0000	0.0005	0.0005
15-17	CONTRACT CONSTRUCTION	0.0021	0.0124	0.0145
19	FABRICATED METAL PRODUCTS	0.0115	0.0029	1.0144
20	FOOD AND KINDRED PRODUCTS	0.0000	0.1335	0.1335
21	TOBACCO MANUFACTURES	0.0000	0.0010	0.0010
22	TEXTILE MILL PRODUCTS	0.0000	0.0000	0.0000
23	APPAREL AND OTHER FABRICATED TEXTILE PRODUCTS	0.0004	0.0406	0.0410
24	LUMBER AND WOOD PRODUCTS, EXC FURNITURE	0.0000	0.0014	0.0014
25	FURNITURE AND FIXTURES	0.0000	0.0081	0.0081
26	PAPER AND ALLIED PRODUCTS	0.0002	0.0114	0.0116
27	PRINTING, PUBLISHING AND ALLIED PRODUCTS	0.0002	0.0133	0.0135
28	CHEMICALS AND ALLIED PRODUCTS	0.0009	0.0187	0.0196
29	PETROLEUM AND RELATED INDUSTRIES	0.0011	0.0210	0.0221
30	RUBBER AND MISCELLANEOUS PLASTIC PRODUCTS	0.0069	0.0124	0.0193
31	LEATHER AND LEATHER PRODUCTS	0.0001	0.0061	0.0062
32	STONE, CLAY AND GLASS PRODUCTS	0.0005	0.0075	0.0080
33	PRIMARY METALS INDUSTRIES	0.0031	0.0100	0.0131
34	FABRICATED METALS PRODUCTS	0.0048	0.0292	0.0340
35	MACHINERY EXCEPT ELECTRICAL	0.0149	0.0230	0.0379
36	ELECTRICAL MACHINERY	0.0472	0.0475	0.0947
371	MOTOR VEHICLES	0.0000	0.0226	0.0226
372-379	OTHER TRANSPORTATION VEHICLES	0.1955	0.0396	0.2351
38	INSTRUMENTS	0.0043	0.0065	0.0108
39	MISCELLANEOUS MANUFACTURING	0.0000	0.0065	0.0065
40	RAILROAD TRANSPORTATION	0.0005	0.0086	0.0091
41	LOCAL SUBURBAN AND HIGHWAY PASSENGER TRANSPORTATION	0.0000	0.0040	0.0040
42	MOTOR FREIGHT TRANSPORTATION AND WAREHOUSING	0.0014	0.0167	0.0181
44	WATER TRANSPORTATION	0.0000	0.0001	0.0001
45	AIR TRANSPORTATION	0.0002	0.0039	0.0041
46	PIPELINE TRANSPORTATION	0.0000	0.0013	0.0013
47	TRANSPORTATION SERVICES, INCL CARRIER AFFILIATES	0.0000	0.0006	0.0006
48	COMMUNICATIONS	0.0139	0.0240	0.0379
49	PUBLIC UTILITIES	0.0035	0.0428	0.0463
50	WHOLESALE TRADE	0.0076	0.0796	0.0872
52-59	RETAIL TRADE	0.0172	0.1681	0.1853
60	BANKING	0.0016	0.0189	0.0205
61+67	CREDIT AGENCIES AND HOLDING AND INVESTMENT COMPANIES	0.0000	0.0041	0.0041
62	SECURITY AND COMMODITY BROKERS, DEALERS AND SERVICES	0.0007	0.0045	0.0052
63	INSURANCE CARRIERS, INCL SOLICITORS	0.0016	0.0277	0.0293
64	INSURANCE AGENTS, BROKERS AND SERVICES	0.0000	0.0091	0.0091
65+66	REAL ESTATE AND COMBINATIONS	0.0073	0.0766	0.0839
70	LODGING PLACES	0.0000	0.0040	0.0040
72+76	PERSONAL AND MISCELLANEOUS REPAIR SERVICES	0.0025	0.0277	0.0302
73	MISCELLANEOUS BUSINESS SERVICES	0.0328	0.0408	0.0736
75	AUTO REPAIR AND SERVICES	0.0025	0.0238	0.0263
78	MOTION PICTURES	0.0000	0.0026	0.0026
79	AMUSEMENT AND RECREATION SERVICES, EXCL MOTION PICTS	0.0000	0.0075	0.0075
80	MEDICAL AND OTHER HEALTH SERVICES	0.0000	0.0351	0.0351
81+89	LEGAL AND MISCELLANEOUS PROFESSIONAL SERVICES	0.0065	0.0157	0.0222
82	PRIVATE EDUCATIONAL SERVICES	0.0000	0.0042	0.0042
84+86	MUSEUMS AND NONPROFIT MEMBERSHIP ORGANIZATIONS	0.0019	0.0078	0.0097
	HOUSEHOLDS	0.4535	0.5358	0.9893
TOTAL		0.8489	1.6860	3.5349

MULTIPLIER - COMPONENTS

INITIAL	1.000
DIRECT	0.849
INDIRECT-INDUCED	1.686
GROSS OUTPUT MULTIPLIER	3.535

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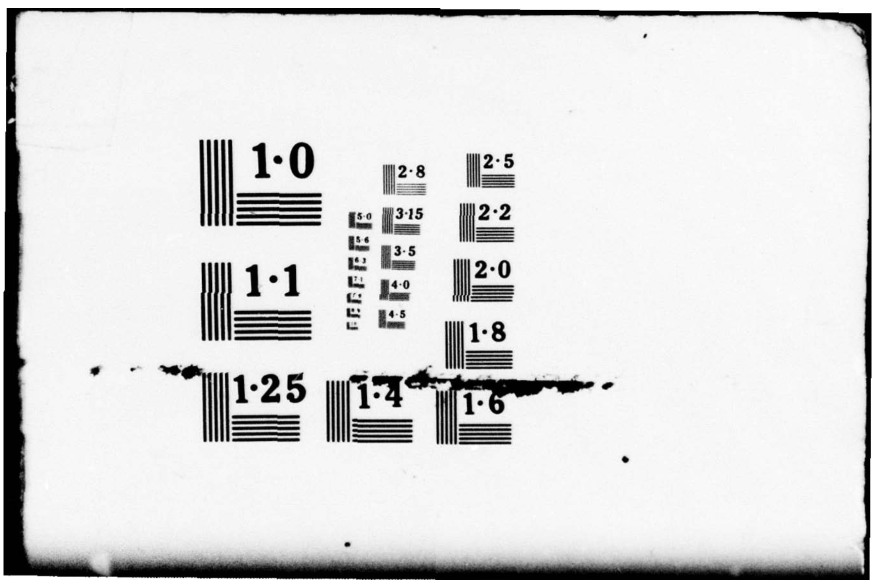
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